

AUGUST 15, 1915
VOL. IX. NO. 6

361-15 14
SINGLE COPIES, 25C.
ONE YEAR, \$1.00

TRANSPORTATION LIBRARY
TL
1
173
V. 9
No. 6

THE COMMERCIAL CAR JOURNAL

Entered as Second-Class Matter at the Post Office at Philadelphia, Pa.

Republic Announcement!

WE desire to direct attention to our 1916 line of Republic Trucks as illustrated and described on pages 57, 58, 59 and 60 of this magazine. We believe this is now the most complete line of high-class motor trucks offered,---in construction, in range of models, in proved efficiency and in price.

Dealers: **Act now!** Get your territory lined up before fall. Read the Republic advertisement inside.

REPUBLIC MOTOR TRUCK CO., Alma, Mich.
"The Honest Truck at an Honest Price"

PUBLISHED THE
15TH OF EACH MONTH

CHILTON COMPANY

MARKET & 49TH STS.
PHILADELPHIA

President, Manager, Truck Buyer

You stimulate your Organization when you Supply it with High Quality Motor Trucks exclusively. You aid your men, and you keep them on their tip-toes.

Quality machines will produce Quality results from the personnel of your Organization. You give your men the right tools to work with—they have the trucks they *want* and the trucks they *need*. Also you eliminate criticism, excuse making, and kicking from your Organization when you buy on a Basis of Quality, not Price.

If you don't buy the best, if you buy a Compromise Truck, and put it in the usual Organization you will get Compromise Results.

You are a good Strategist when you buy the Best Truck. Your Organization *can* make it pay and it's up to them to make good. The Right Truck, The Locomobile Truck, "The Best Built Truck in America" *always* has made good. Can you afford anything but the Best Truck?

Locomobile Motor Trucks

Three-Ton, Four-Ton, Five-Ton, Six-Ton
WORM DRIVE

Locomobile Three and Four-Ton Worm Drive Trucks are available for prompt delivery.

"The Best Built Truck in America" contains the finest Materials, exhibits the finest Workmanship, and has every advantage in Design. Indeed, what other Three and Four-Ton Trucks offer all these features?

Worm Drive. Right Drive. Four-Cylinder Motor with Five Bearing Crank Shaft. Four Speeds and Reverse. Full Floating Rear Axle. Front Running Boards. Large Grease Cups. Heat-Treated Pressed Chrome Nickel Steel Frame. Chrome Nickel Steel also for Crank Shaft, Connecting Rods, Valve Tappets and Rollers, Propeller Shafts, Gears, Gear Shafts, Live Axles. Two Lengths Chassis. Wood Wheels Standard; Steel Wheels extra. Three-Ton Chassis, \$3500 (\$100 less than the average cost of the leading seven Three-Ton Trucks). Four-Ton Chassis, \$3650.

The Locomobile Truck has been investigated, tested, approved, and purchased by the largest institutions in this country and abroad. Our Trucks are used by: The United States Government, The British Government, The Russian Government, The Pennsylvania Railroad; Cities of Chicago, Vancouver, Baltimore, and Seattle; State of Connecticut; United Fruit Company, National Fireproofing Company, Barrett Manufacturing Company, Cross, Austin & Ireland Lumber Company, Barber Asphalt Paving Company. We have delivered *hundreds* of Worm-Drive Trucks this year.

The LOCOMOBILE COMPANY of AMERICA
BRIDGEPORT, CONN.

**SEND FOR OUR TRUCK CATALOGUE, OUR REPRESENTATIVE OR BOTH
"WE GO ANYWHERE FOR BUSINESS"**

THE PUBLISHERS' PERSONAL PAGE

A Full Purse Maketh a Good Spender

Mr. Manufacturer, Mr. Dealer:

Do you realize that now is an opportunity such as you will probably never again have? If you are not already loaded up to the tailboard with work for the belligerents, look at the possibilities which now exist in your home trade.

Where Volume Sales Will Be Made

The farming communities of the United States will in the near future absorb more trucks than have ever been sold in all of the cities combined. The farmers of America are motor users. They are familiar with the gasoline engine. Many of them already own automobiles and are believers in motor-driven trucks. They are only waiting for a prosperous season.

Crops Worth Billions

The wheat crop this year has broken the record for any country. The potato crop promises to do likewise. The wheat alone will be worth \$1,000,000,000, while the corn crop may reach a value of \$2,500,000,000. These are figures announced by the Department of Agriculture. Corn will probably increase 100,000,000 bushels, while potatoes promise to exceed any former record by 103,000,000 bushels. Tobacco has increased 28,000,000 lbs., and flax, hay, rye, etc., have also increased.

A Money Harvest

With this tremendous increase in production, combined with a demand for food products in Europe greater than has ever before existed, the farmers will reap a money harvest which will be unprecedented. This is to be their prosperous season.

An Opportunity

Here is the opportunity for the live manufacturer and dealer. Provide suitable interchangeable bodies for farm work. Cultivate the home market for commercial cars for farming communities.



Autocars Are Extensively Used in the Lumber Business

C. B. Coles & Sons Co., Camden, N. J., decided on the Autocar to meet the demand "for quick work in hauling to the suburbs, which costs heavily by team on account of the time consumed in making the long trips."

Representative lumber and building materials companies in all sections of the country are adopting Autocar Motor Vehicles, not only because of the saving in time, but also because Autocars make long haul business economical and give prompt, regular service at all times.

Write for illustrated catalog and list of over 2600 concerns using Autocars in every line of business

Chassis Price, \$1650

THE AUTOCAR COMPANY, ARDMORE, PA.
Established 1897 **MOTOR CAR DELIVERY SPECIALISTS**

The Commercial Car Journal

VOLUME IX

PHILADELPHIA, AUGUST 15, 1915

NUMBER 6

S. A. E. ISSUES NEW DATA SHEETS

The Society of Automobile Engineers has sent to its members a number of additional data sheets for the S. A. E. Handbook.

Among the data sheets are those giving details of the most recently adopted standards of the society, rendering immediately available the information as to these. In addition, the table of horsepower values derived from the N. A. C. C. (formerly A. L. A. M.) formula has been extended to cover eight and twelve-cylinder engines. Conversion tables of percentage of grade to angle of grade are also included. Piston displacement tables for eight- and twelve-cylinder engines of from 137.4 to 1531.5 cubic inches content are given. Two sheets are devoted to crank angles and corresponding piston positions. The effect of altitude on horsepower development of gasoline engines is treated on three sheets, with curves and formulas. Diametral and circular pitch tables, which are useful to engineers in laying out transmissions and other gear work, are given on four sheets. To the metric conversion data previously issued there has been added a table giving decimals of a millimeter for each thousandths of an inch. It is believed that this is the first time this information has been distributed generally.

The new table of standard linear units should be found very beneficial, as well as the conversion curve of miles per gallon to liters per 100 kilometers, enabling the engineer to judge intelligently of gasoline consumption performance expressed in terms of the metric system. The sheets on the standardization of pipe thread gages, total keyway depth, equivalent values of electrical, mechanical and heat units and the economical selection of belts and pulleys, make the Handbook of greater value.

Simultaneously with the distribution of the new sheets, a revised index was issued containing exhaustive cross references in order that all data in the Handbook, which now contains over 400 pages bound in two loose-leaf folders, can be located in a minimum of time.

As new standards now before the society for mail ballot are adopted, additional data sheets will be issued. The society also collects and prepares for publication other data than its own adopted standards.

M. T. C. NOW AN OWNERS' ORGANIZATION

The Motor Truck Club of America is now an owners' organization as far as new members are concerned. At the July meeting final action was taken on an amendment to the by-laws providing that owners or operators of motor trucks only shall be eligible to election as active members. The present members, who are manufacturers, dealers, owners and operators, remain undisturbed. The annual dues have been fixed at \$25.

Table of Contents

	PAGE
Advertisers' Index.....	103
Accessories and Appliances.....	28
Autocar With Power Hoist.....	20
Buffalo Moves and Hauls by Commercial Car— By Geo. W. Grupp.....	15
Buffalo 'Bus Lines.....	33
Carting, Trucking and Hoisting by Trucks.....	36
Commercial Cars.....	17
Co-operative Management Makes Dump Trucks Pay—By Frank Reed.....	25
Editorials.....	7
Foreign News From Across the Water.....	41
In the World of the Electric.....	39
Motor Truck Design and Construction Made Plain—By C. T. Schaefer.....	22
Municipal Motor Limitations and Possibilities.....	42
Parcel-Post and Mail-Collection Tests of Elec- tric Vehicle—By A. Jackson Marshall.....	39
Personal Items.....	4
Post Office Using Commercial Cars—By Lee L. Robinson.....	34
Road Legislation and Development in Great Britain—By Our Foreign Correspondent.....	41
Schools Operate Motor 'Bus Systems for Trans- porting Pupils—By C. L. Edholm.....	46
Trucks Effect Big Saving in Tunnel Construc- tion—By A. A. Willoughby.....	32
Trucks vs. Railroads.....	9
U. S. Motor Trucks Built in Four Sizes.....	17
Where is the Ford of the Commercial Car Field? —By Chas. H. Spencer.....	5

STERNBERG COMPANY NOW STERLING

Sternberg Motor Truck Company, Milwaukee, Wis., has changed its name to the Sterling Motor Truck Company. This announcement does not imply any change whatever in the personnel of the company, its stockholders, directors or departmental heads. It is made in response to the large and growing popularity of the worm-drive truck, of which the present organization began the manufacture nearly three years ago, and which during the latter part of the past year was built under the trade name of Sterling to distinguish it from the chain-drive trucks produced for 9 years under the name Sternburg.

ARTHUR R. PARDINGTON DEAD

Arthur R. Pardington, vice-president of the Lincoln Highway Association, died on July 28th in Detroit. He was prominently connected with motor racing affairs in this country for many years. Being a good organizer and detail man, he handled the great mass of his work in a very competent manner. The building of the Long Island Parkway was one of his works. He became associated with the Lincoln Highway a couple of years ago and worked assiduously for it, traveling all over the country addressing boards of trade, etc., to tell them about the Highway. He will be greatly missed in the development of the highway plan. It has been suggested that a monument or marker of appropriate design should be placed in some prominent part of the Highway calling attention to his work to make the Highway a realization.

IMPROVEMENT IN AFFAIRS OF INTERNATIONAL MOTOR COMPANY

The earnings and finances of the International Motor Company are in a much improved condition, and the company has no obligations falling due until the fall of 1916. If the present volume of business continues, these debts will probably be paid off out of the treasury funds. The factories are working to capacity, turning out Saurer trucks for shipment to England and Belgium. There has also been a very encouraging increase in domestic trade for the Mack truck. The company is now earning at the rate of \$90,000 per month, and it is very likely that in the current year, to December 31st next, a surplus of \$700,000 will be earned. This is after charging off interest on the funds advanced by stockholders in the company who agreed to forego interest on their advances.

The Safety-First Federation of America will hold a convention in Detroit next October, at which the motor 'bus and jitney 'bus will be discussed.

CHICAGO PROTESTS AGAINST FENDER ORDINANCE

Chicago has an ordinance compelling all motor trucks to be fitted with fenders. Vigorous protests against its enforcement have been made by the Chicago Automobile Trade Association of Commerce, the Traffic Club and numerous private owners, who met in the Council Chamber to enter their objection to the enforcement of this law, which was passed more than a year ago, but has been permitted to remain dormant until the present time. The clerical, mechanical and inspection bureau of the Department of Police is charged with the enforcement of the law.

Objection to the use of fenders on motor trucks was based on an investigation made by Russell Huff, president-elect of the Society of Automobile Engineers. As a consulting engineer in Detroit, Mr. Huff has tested hundreds of fenders and investigated scores of other models and has come to the conclusion that "the motor truck fender has proved an almost unqualified failure," said Mr. Huff's report. "They do not save the lives of the public; they are likely to cause more accidents instead of preventing them; they add to traffic congestion; being imperfect mechanically, they are easily damaged in service and become inoperative within a short time; they are no more needed on motor trucks than on horse-drawn vehicles, automobiles and motor cycles; they cost from \$150 to \$200 each and are a purely experimental burden on the truck owner."

Police and coroners' reports from various cities show that only about 10 per cent. of the truck accidents consist of victims struck by the front of the truck. The other 90 per cent. are caused by people getting under the truck from the side, between the front and rear wheels. This is especially true in cases of accidents to children. Truck fenders even if perfected to the highest degree, could not prevent these accidents."

Chief of Police Healey, who is the final judge of the type of fender to be adopted, according to the ordinance, now has under consideration half a dozen auto truck fenders for adoption or rejection.

Marshall Field & Company, Carson, Pirie, Scott & Company, John A. Colby & Son, Wm. J. Lemp Brewing Company, Albert Dickinson Seed Company, Reid-Murdock & Company, Chas. A. Stevens & Brother, Mandel Brothers, Chicago Telephone Company, Commonwealth Edison Company, and The Consumers Company, all large motor truck fleet operators, have entered protests against the enforcement of the motor truck fender ordinance.

A Jitney Automobile Service will be inaugurated in the Yosemite, auto buses being licensed to operate on the floor of the valley. A moderate fee will be charged. The Desmond Park Service Company is in this new enterprise.

Indiana Section of the S. A. E. has changed the date of its opening meeting from September 17th to September 24th. J. G. Vincent will be the principal speaker of the evening, his address being entitled, "Modern Tendencies in Motor Design." J. E. Diamond, engineer of the Aluminum Casting Company, will make an address on "Aluminum Pistons."

The CCJ has most advertisers because it gives them biggest returns

ELECTRIC PROSPERITY WEEK

The Society of Electrical Development, Inc., has inaugurated an Electrical Prosperity Week to be held November 29th to December 4th. Every known agency will be employed toward the success of this demonstration, which will be held all over the country during the week mentioned. The Electric Vehicle Association has pledged its support, and every one of its members will be an enthusiastic worker for the Week. Parades of electrical vehicles will be held, containing unusual floats, demonstrating floats, special lighting effects, etc. There will also be endurance runs and sociability runs of electric vehicles.

MOTORCYCLES AND BICYCLES TO BE DISCARDED FOR MAIL DELIVERY

The Postoffice Department on January 1, 1916, will discard all motorcycles now in use by rural carriers throughout the country. This is the effect of an order issued by Postmaster General Albert L. Burleson. The order amends Section 811, Paragraph 3, of the Postal Laws and Regulations.

The reason given for discarding the motorcycle and bicycle is that in bad weather it is impossible to protect the mail carrier; and it is almost impossible to use a two-wheeled vehicle on account of road conditions. A carrier using a motorcycle or bicycle is tempted to discourage parcel shipments, while inadequate equipment is the cause of many complaints, alleging that the rural carriers are overburdened.

This order of the Postmaster General, coupled with the plan already being put into effect by his department, under which city delivery by automobile is to be extended as rapidly as possible from all large cities of the country to points within a radius of 25 miles, means that within the next 6 months the number of automobiles in use in the Postoffice Department throughout the country will be enormously increased.

Bell Motor Car Company, York, Pa., will shortly place on the market a 1200-lb. delivery car, the price of which, without electric lights and starter, will be about \$775. It will be built on the same chassis as the touring car.

Hannibal Wagon Works, Hannibal, Mo., will shortly bring out a light commercial car to sell in the neighborhood of \$500. It will be known as the Hannibal. A large extension to the wagon plant at S. 10th and Collier Streets, is now being planned.

Kelly-Springfield Motor Truck Company, Springfield, Ohio, will add four new commercial cars bringing the Kelly line up to seven vehicles ranging in capacity from one- to six-ton. The new trucks known as the K31, K35, K45 and K60, are one and a half-, two-, four-, and six-ton. Improvements have been made, but no radical changes have been made.

Fostoria Light Car Company, Fostoria, Ohio, has been incorporated for \$100,000, and is building four types of cars, viz.: roadster, five-passenger touring, coupe and light delivery truck. The company is in a position to make immediate delivery on all the models. Officers are: J. H. Jones, president; Ira Cadwallader, vice-president; Chas. Ash, secretary-treasurer; A. O. George, factory manager.

Personal Items

H. D. Church, for 5 years truck engineer for the Packard Motor Car Company, has become assistant chief engineer.

E. A. Schenck, formerly manager of the Invader Oil Company, joined the sales force of the White Star Refining Company, Detroit.

M. B. Fletcher, Detroit branch manager of the Fiedeisen & Kropf Manufacturing Company, has resigned and has been succeeded by Henry L. Grinsell.

S. A. Welch, formerly connected with the Blevins Auto Sales Company, Toledo, Ohio, has become manager of the Studebaker wholesale agency recently opened in Cincinnati, Ohio.

Day Baker, New England manager of the General Vehicle Company, Inc., has been appointed manager of the agency sales, foreign sales and central station department of the same company.

Walter C. Guilder, formerly connected with the production department of the Timken-Detroit Axle Company, has become factory manager of the Kelly-Springfield Motor Truck Company, Springfield, Ohio.

D. G. Wilcox, Jr., for 4 years advertising manager of the Regal Motor Car Company, Detroit, is now advertising manager of the Republic Motor Truck Company, Alma, Mich., with headquarters in Detroit.

H. P. Branstetter has taken charge of the wholesale and retail business of the Kissel Motor Car Company, in Chicago and Illinois territory. For the last 2 years he has been handling the distribution of Kissels in Indiana and Illinois.

S. H. Fuller, for 5 years connected with the Banker Wind Shield Company, Pittsburgh, Pa., has become president and general manager of the Penn Brass & Manufacturing Company, which specializes in plating of all kinds, special machine work, brazing, welding, forging and automobile repairing.

G. H. Dalrymple, who has been connected with the automobile industry for the past 9 years, and formerly with the Speedwell Company, Dayton, Ohio, has joined the sales staff of the Standard Motor Truck Company, Detroit, and has been assigned to travel in the States of Indiana and Ohio.

Chas. Balough, for the last 5 years connected with the Kelly-Springfield Motor Truck Company, Springfield, Ohio, as chief engineer and works manager, resigned from that position to take up the development of a new proposition in the commercial car field. His headquarters are Columbia Street and Dakota Avenue, Springfield, Ohio, where he is conducting the development work of his new connections.

Earl McGookin, for 12 years connected with the Stewart Warner Speedometer Corporation, of Chicago, and for the past 7 years manager of the Detroit branch, has become identified with the Springfield Metal Body Company, Springfield, Mass., which will establish a plant in Detroit for production business exclusively. Mr. McGookin has bought an interest in the business and will have associated with him in the new plant Jos. Boyer, Jr., and W. T. Fry. S. A. Douglass will succeed Mr. McGookin as manager of the Detroit branch of the Stewart Warner concern.

Locomobile Company, Bridgeport, Conn., has recently secured an order for 500 motor trucks from Russia and Great Britain.

White Company, Cleveland, Ohio, has received an additional order for 2400 trucks for Europe. The company had orders for 5400 trucks for quick European delivery.

Where is the Ford of the Commercial Field?

The Light Delivery Car Covers Greatest Variation of Commercial Service

By CHAS. H. SPENCER

BOTH manufacturer and merchant are awakening to the value of the small delivery car. It has taken much training and some years of experience to convince the manufacturer and the user that the light unit delivery vehicle is one of the most important factors in the transportation field to-day.

No matter from which side you view the subject of values, either from the maker's standpoint as a manufacturing proposition or the merchant's side who seeks profitable service in motor truck delivery, the small commercial car has at last hit the popular fancy, and it stands to-day squarely before the buyer as a legitimate investment with an established value.

The manufacturer is already casting covetous eyes at small types of delivery vehicles now on the market. They are sitting up and taking notice, and the Ford of the commercial field may be heralded from some quarter in the very near future.

The Commercial Car Journal has long prophesied big returns for the concern that would build a consistent type of light delivery car—one designed and built especially for business use, having a carrying capacity ranging from 500 to 1500 lbs. and costing between \$500 and \$1000 complete.

A light load commercial car conceived from the ground up for practical daily service and not a converted touring car, is the type the merchant has been waiting for, and until only recently has the subject been given enough study to develop a suitable number of small types capable of giving the service required.

It has been an expensive experience for many merchants, who were led to believe that because they could put a commercial body on a pleasure car chassis and call it a light unit car, that they could get away with it and thus meet their delivery obligations profitably. In some cases the lightly constructed cars did not withstand the hard usage given them. The education, however, has been highly beneficial, as it compelled the manufacturer to get busy and give the merchant what was wanted.

It still seems strange that with the experimentation period passed and a sounder knowledge gained of the merchant's needs, the manufacturers are now putting out only about 4 per cent. of all the commercial car production into the light service car models.

The writer has contended for many years that manufacturers of commercial cars were devoting too much time to developing the bigger units of motor trucks, to the exclusion of the smaller types, and ignoring unprecedented opportunities in the sale of the lighter units.

In gathering the data which this article includes, both manufacturers and users of delivery vehicles were requested to state their opinion of the value of the small delivery car. It is interesting to note that the hundreds of replies received were unanimous in their comments of the wide and profitable use of the small delivery vehicle.

One manufacturer states that he is of the positive opinion that the light car is the one which is going to be the big seller, and some day in the future, and not very far distant, some truck manufacturer putting out a light car is going to be a running mate, only in the commercial field, of Henry Ford. The representative of this concern continues to state: "When you stop to consider that not only every small merchant who has free delivery service has need for a light delivery car, but that every farmer in the country can also use one instead of his light horse and buggy, that is, the old democratic wagon used for taking small loads, such as butter, eggs and cream, and possibly one hog or a couple of sheep or a calf to market, I think you will agree that the surface has not even been scratched so far as the small commercial truck business is concerned.

"On the other hand, the European war is bringing about the universal use of motor trucks of all sorts and sizes in this country a great deal quicker than it would have arrived had this war not started. For instance, from Waterloo, Iowa, they are shipping every week not less than 1000 horses. These are being bought up by local horsemen from farmers around the country, and there are practically no horses in town now, except for draying and delivery purposes, and these are rapidly being replaced with motor trucks."

Another builder of the small car says: "We are shipping on an average now of about fourteen cars per week and are still behind over three hundred cars on order. This is practically all business in the United States; in fact, we have not gone after foreign business, although we are building up a good export trade with some foreign agencies, but no war business."

Another leading manufacturer states: "Until recently the production of the heavy vehicle for commercial purposes has surpassed that of the lighter delivery truck. From records compiled by the Government and various journals, we learn that the steamships and the railroads combined handle about 14 per cent. of the total merchandise transferred; balance, 86 per cent., to be taken care of by horse and wagon, or by gasoline and electric propelled vehicles."

Statistics

"Similar investigations have proven that nearly 85 per cent. of all merchandise transportation, not including that taken care of by steamships and railroads, can be practically handled by the light motor truck. This leaves but 15 per cent. for the larger vehicle. Yet, as before mentioned, the production of the latter has greatly overrun that of the light motor truck. In the writer's estimation the motor truck industry as a whole will not reach the highest point of efficiency until it complies with the actual demands of transportation."

"The Interstate Commerce supplies us with interesting figures, showing that 95 per cent. of the total parcels delivered,

handled in the United States, average less than 50 lbs. each. A large department store that makes a specialty of analyzing delivery methods has concluded that all loads for retail distribution do not average over 550 lbs. each.

"The ultimate delivery truck will be so constructed that its weight will reduce to a minimum the 'non-pay-load' and each problem will be handled separately, using vehicles that will carry their full capacity."

Costs of Different Carriers

Still another manufacturer analyzes his reasons for going into the making of the small unit delivery car as follows: "Probably the most that I can say concerning the value of the small capacity delivery car to the transportation of merchandise can be concisely expressed in the following comparison of data: All the foodstuffs and merchandise of the world are moved between fields, manufacturers, jobbers, and retailers, to the markets by railroads, steamship lines, canals, rivers, horses and wagons, and automobiles. The various costs of transportation by these lines will average as follows:

	Per ton mile
Steam railroads .....	.007 to .008
Canals and rivers .....	.001 to .003
Lakes and oceans .....	.005 to .001
Autos, horses and wagons .....	.25 to .50

"When it is realized that railroads, steamships, and canal barges, haul about 15 per cent. of the total movement of merchandise, and that horses and wagons and automobiles are depended upon for moving the balance, one can see how important is the construction of motor car delivery vehicles. The field for the light delivery car is represented by 85 per cent. of this latter movement of merchandise by horses and wagons and automobiles. Slightly less than 15 per cent. of the work represents the field for trucks with capacities averaging from 1500 lbs. to 10 tons. Why this has not been more generally realized by truck manufacturers is almost beyond comprehension, but the demands being made every day by merchants for vehicles of light capacity, and the inquiries received by manufacturers of larger cars and trucks alike, show that the field does not only exist in theory, but is alive and clamoring for the light car."

Comments by Users in Small Trucks

As to the comments made by the users of motor trucks, out of the large number of concerns interviewed, they were unanimous in expressing their opinion of the value of the small capacity commercial car. While some stated that they were obliged to use large capacity cars, each concern believed that they could very profitably use one or more 500 to a 1000 capacity delivery cars and effect a great economy and convenience in their delivery service.

One merchant said that up to a couple of years ago the manufacturer of motor trucks had not considered the merchant's total needs in transportation. He concluded by saying that they built and sold only big cars

and expected the user to make all deliveries with this type. It has proven impractical and also unprofitable to send a keg of nails ordered by 'phone for immediate delivery in a two-ton truck. The increasing demand, therefore, for the small car is to take care of this class of delivery, covering short trips and emergency calls.

One large user of commercial cars, whose experience has covered 8 years in experimenting with different types and capacities of motor trucks, states that his firm doubtless would have saved considerable money had they earlier started in with smaller units. They are large nationally known jewelers in one of the Eastern cities, and were one of the pioneers in the use of motor vehicles in their delivery department. They originally owned ten horses. Their first delivery car was a two-cylinder Cadillac, a transformed type of pleasure car for commercial use. Their next purchase was a Rapid Truck, and later they bought four Autocars, two Commercial Electrics, and two Fords. Their present equipment consists of two Autocars, two GMC's, and three Vims. One reason for their not securing lighter cars earlier was due the manufacturers not being willing to supply them with long enough bodies to carry hall clocks, which run in lengths from 6 to 9 ft. The manufacturers of small cars now make bodies large enough to conform to the delivery demands of their customers, providing the sum total of the load carried does not exceed that of the car's rated carrying capacity.

It is worthy of mention that the user, after many years of education and advice, is beginning to realize that to exceed the prescribed load of the car's rated carrying capacity means loss by early depreciation, and this phase of delivery is now being given the attention it has so long deserved.

One concern called upon, a large dry-goods and department store, very kindly gave an interesting accounting table, and through this means of computing a car's operating costs they have been enabled to arrive at some interesting deductions concerning the value of their delivery service. The man in charge of the delivery department says they have fewer horses now than at any time in 10 years, and now own forty-two automobiles of various capacities. Their delivery expenses are greater than ever, but their business is also greater, and

when they consider the fact that they formerly were obliged to send a large portion of their packages by freight and express, and maintain special horse and wagon service in many towns in outlying districts, where they now deliver direct by auto to the ultimate consumer, they realize that when figuring out comparative costs, that in view of services rendered and final expenses, there is a decided economy in operating motor delivery vehicles. Their system of figuring, which individualizes the cost and result of each unit in operation, has convinced them that the few horses now in service will soon be replaced with light delivery vehicles. They were helped to form this conclusion through the following table:

Record of Car	
Car—Trip No.—Miles—Reg. and Extra.	
Direct Charges	
Tires—Rep. to chassis—Rep. to body—	Sundries—Gas (gal.)—Oil (pts.).
Garage Charges Distributed	
Tubes—Sundries—Repair parts—Night salaries.	
Shops	
Repair parts—Sundries—Day salaries.	
Insurance	
Depreciation	
Proportion of General Expenses	
Storage	Total
Expense per Mile	

To make a sweeping change at once, doing away with the balance of horses in service, and replacing them with small types of car, would prove too expensive. This concern has, however, planned to have in the very near future but one organization of motor drivers and mechanics, instead of two systems of delivery.

It has been one of the greatest surprises to the writer that more complete records have not been kept of the individual service of the motor trucks in use, which represent an investment of many thousands of dollars, and the sooner that individual records are kept of each car in service, the sooner accurate knowledge of the values of the various units will be made clear, and the sooner will the merchant come to realize that profitable service can be rendered by the use of the light commercial car.

The manufacturer who first awakens to the growing interest the merchant is taking in the small capacity delivery motor car, will be so much along the way toward the coveted goal of the auto manufacturer, the Ford of the Commercial Field.



Troy Company Operating Five-Cent 'Bus

This company is using Federals, the interior and exterior of one of which is herewith shown. The success of these buses has been such that the electric street cars have been affected. 'Buses are also used between Albany, Troy, Pittsfield, Mass., and other Massachusetts towns. On long distance runs a higher fare is charged. Some of the modern 'buses are fitted up more luxuriously than street cars or trains.



The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

DENIES USE OF HIGHWAY TO TRUCK

One of our truck owners, operating a three and a half ton truck in Otsego County, has been notified by the Superintendent of Highways of two of the towns to the effect that they would not only be held responsible for any damage done to the highways and bridges, but were also forbidden to operate the truck at all.

Will you kindly advise what the legal status of this action is, and what precedents have been set?

TRI-CITY MOTOR CO., INC.

Albany, N. Y.

You hardly give enough facts to enable me to form an intelligent opinion. Undoubtedly the Superintendent of the Highways has a right to prohibit the operation of vehicles which would prove destructive to roads that were properly prepared, and if your trucks are that kind—although I can scarcely conceive of their being so—it is within the power of the superintendent to prohibit their use.

The superintendent, however, would have no right to prohibit the use of trucks which were in general use elsewhere, merely because they destroyed roads which were particularly susceptible to destruction on account of not being prepared properly. It is such a radical thing for a Superintendent of Highways to prohibit absolutely the use of a given truck that the burden would clearly be upon such an official to show ample cause and legal authority for doing so.—E. J. B.

Factory News and Changes

International Motor Company, maker of the Mack and Saurer trucks, Plainfield, N. J., is erecting addition to factory 120x120 ft., as well as an addition 60x30 ft. to the power house.

Booth-Felt Company, Inc., Brooklyn, N. Y., has taken space in the Farrand Bldg., 12th Street and G. T. R. R., Detroit, and is installing machinery and complete equipment for manufacturing everything in the line of felt used by the automobile and accessory trades. Mr. Maurice Sanborne, of New York, is in charge.

Fuller & Sons Manufacturing Company, Kalamazoo, Mich., owing to the great demand for Fuller transmissions, will erect a large modern addition to its plant. The building planned provides for two and a half times the present capacity, with provision for still more a little later. Thousands of dollars worth of new machinery, especially adapted for making transmissions, has already been ordered, and still more is under consideration.

Hyatt Roller Bearing Company is erecting handsome, modern building at Cass Avenue and West Grand Boulevard, Detroit, which will be the home of the sales and engineering departments of the automobile division of the Hyatt Company. The structure will be three stories high, and its exterior will be rough red brick, with fine stone trimmings and cornices, while the interior will be finished throughout with quarter-sawed oak. The first floor will contain the reception room, service room, offices of the experimental engineers, mailing room, lavatory, machine and experimental room, and the garage and telephone room. On the second floor will be the various offices, woman's rest room and men's smoking room. The usage of the third floor has not yet been decided upon.

AUGUST 15, 1915

THE COMMERCIAL CAR JOURNAL

7

THE COMMERCIAL CAR JOURNAL

Entered as second-class matter at the Post Office at Philadelphia, Pa.
under the act of March 3, 1879

Vol. IX.

PHILADELPHIA, AUGUST 15, 1915

No. 6

Published the 15th of each month by the
CHILTON COMPANY

Market and 49th Streets
JAMES ARTMAN, President
GEO. H. BUZBY Vice President

Philadelphia, U. S. A.
C. A. MUSSelman, Treas. and Gen'l Mgr.
A. H. VAUX, Secretary

ADVERTISING DEPARTMENT

Eastern Mgr., C. MONROE SMITH, New York Western Mgr., C. C. McKINNEY Chicago

EDITORIAL DEPARTMENT

JAMES ARTMAN, Editor-in-Chief
E. S. FOLJAMBE, Managing Editor
ALBERT G. METZ, Ass't Managing Editor
J. HOWARD FILE, Associate Editor

SUBSCRIPTION RATES

United States and Mexico One Year, \$1.00
Other Countries in Postal Union, including Canada One Year, \$2.00
Make checks, money orders, etc., payable to Chilton Company

Change of Address — Subscribers desiring their address changed, should give the old
as well as the new

The Commercial Car Journal is a Member of the
Audit Bureau of Circulations

SIGNIFICANCE OF CHANGE OF NAME

 THE tendency of the time toward motor delivery was clearly indicated at the 13th Annual National Convention of the National Team Owners' Association in Springfield. Motor delivery was as fully, if not more fully discussed, than any other subject, and the organization changed its name by open vote to the National Team and Motor Truck Association. The officers state that the change in name will not in any way change the character of the association, which is only another proof that virtually the association is already a motor users' association.

This recognition of the possibilities of motor delivery by the largest organization in the country devoted to delivery, of course points to its belief in the ultimate future of the truck. This is a step in preparation for the time when the horse will be as scarce in delivery as he is now for pleasure driving.

The tail-board delivery fight and the solution of terminal facilities, two topics largely discussed by this board, are so interwoven with motor transportation as to make their interests identical. It is, therefore, but natural that gradually an association wrestling with the vast problems of transporting merchandise in congested centers should adopt modern commercial car methods. This action on the part of large transport companies, movers and storage warehouse concerns, express companies, etc., should be, to all non-motor users, a significant index finger, pointing the way.

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

REQUIREMENTS OF UNITED STATES FOR ENLARGED MOTOR TRANSPORT

Subsidy Not Necessary, But Competent Drivers Are



FROM time to time we have called attention in these columns to the great need of our Government for more motor trucks in connection with the War Department. The recent establishment of the Advisory Committee by Secretary Daniels will, in all probability, eventually result in a greatly increased use of motor trucks by all branches of our service.

It is common practice abroad to subsidize such vehicles that come within the government specifications or requirements, paying to these owners a yearly sum for the privilege of the use of their trucks in case of war. The question of subsidy in this country is one that will naturally arise, but we see no reason why this country should ever find it necessary to subsidize vehicles. Our conditions are very different from those abroad. The enormous number of vehicles in use in the United States, as compared with those in any European country, makes available, in time of stress, transportation facilities such as no European country enjoys. Our production facilities are many, many times that of any European nation, so that even at short notice large numbers of vehicles could be thrown into the field. Special inducements which will doubtless cost very much less than any subsidy policy will result in the Government obtaining the use of a sufficient number of trucks. For these reasons we believe that this country will not need to subsidize vehicles.

Drivers' Schools Necessary

There is a need, however, which must be cared for at once, aside from appropriation of sufficient funds for motorizing the service. We refer to adequate arrangements for instructing and turning out competent military truck operators. At the present time the Government has no proper facilities whatever for graduating trained men for the handling of an enlarged motor transport, or even for handling the few motor driven vehicles now in use. Trucks can be obtained very much more easily than trained operators. One of the first problems, therefore, which must be met is the establishment of suitable schools with proper courses of instructions for army drivers, repairmen and mechanics.

\$30,561,880 FOR THE TRUCK MAKERS IN ELEVEN MONTHS



THE unprecedented increase in the exports of trucks caused by the European War is not only continuing but is even increasing in volume and value of trucks exported. The latest United States report of the Bureau of Foreign and Domestic Commerce shows an increase from 99 commercial cars exported in May, 1914, to 2426 in May, 1915. For 11 months ending May, 1914, there were exported 694 trucks, valued at \$1,061,354. The tremendous growth of exports of trucks to the warring nations is shown when these figures are compared with the exports for the 11 months ending May, 1915. No less than 11,006 trucks were exported, valued at \$30,561,880.

Practically all of this business is cash, payments being made in gold. There are no service expenses or difficulties. The manufacturers' responsibility ceases on this side of the water. No wonder the war order business is eagerly sought.

A Warning

There is a grave danger, however, that the truck makers, in their eagerness for war order business and in their efforts

to produce in large quantities in the short space of time available, will neglect and overlook the home trade which is now opening up.

Most of the truck makers desire to continue in business, and would not be content to handle a war order and then find that their home trade, having been neglected, was lost.

Now is the opportunity, especially for the small truck makers, who have not been able to handle the export business, to reap the benefits of catering to the home trade. Now is the opportunity for them to build up and establish a good business in their own country, and this is especially true of sales in farming communities.

Steel and Rubber Markets

Steel Prices Increase

Since our last report the price of steel has taken a considerable jump. Prices on steel bars, plates and shapes have advanced to \$1 per ton. War orders are, of course, the chief sustenance of the steel mills, many of them refusing new orders. Railroad activity is mainly confined to new car orders, bridge building being limited while the rail business seems to indicate that the railroads are trying to make the old rails last longer. Quotations on August 9th were:

STEEL PRODUCTS PRICES

Bessemer billets, per ton, mill	22 00	a 23 00
Open hearth, per ton, mill	22 50	a 23 50
Sheet bars, per ton	23 00	a 24 00
Steel bars, soft base, half ex-tidewater	1 41	a 1 46

The above prices are at tidewater, in carloads and larger lots. For quantities less than 2000 lbs., but not under 1000 lbs., \$2 per ton additional is charged, and less than 1000 lbs., \$8 per ton additional.

SHEETS

The following prices are for 100-bundle lots and over f. o. b. mill; smaller lots \$2 per ton higher.

*Galvan-		*Galvan-			
Gage—	Black.	ized.	Gage—	Black.	ized.
Nos. 22-24	1 60	4 05	No. 28	1 75	4 50
Nos. 25-26	1 70	4 20	No. 29	1 80	4 75
No. 27	1 70	4 35	No. 30	1 90	5 00

*Galvanized prices range from 4 50 to 5 25 for No. 28 base. Other sizes in proportion.

IRON AND STEEL AT PITTSBURGH

Bessemer iron, Valley furnace	14 75	a 15 25
Bessemer steel, f. o. b. Pittsburgh	21 00	a ..
Skelp, grooved steel	1 20	a 1 25
Skelp, grooved iron	1 60	a 1 70
Ferro-manganese (80 per cent.), seaboard	100 00	a ..
Steel, melting scrap	12 50	a 13 00
Steel bars	1 25	a 1 30
Black sheets, 28-gage	1 75	a 1 80
Galvanized sheets, 28-gage	4 00	a 4 50
Blue annealed, 10-gage	1 35	a 1 40
Tank plates, $\frac{3}{4}$ and heavier	1 30	a 1 35

Standard Motor Truck Company's assets have been taken over by the Warren Motor Truck Company, Warren, Ohio.

C. H. Johnson, Owosso, Mich., mail carrier between the depots and the post office has put two commercial cars into the service. They are Ford cars with the regulation post office wagon tops.

New Velle Selling Plan. The Velle Motor Vehicle Company has heretofore distributed its products mostly through implement dealers handling the products of the John Deere Plow Company but will hereafter contract direct with responsible motor car dealers and distributors, eliminating the Deere Plow branches. This plan presages no segregation from the Deere interests.

Chicago Pneumatic Tool Company, Chicago, builder of the Little Giant truck, has made arrangements with the Trailer Transportation Company, New York City, to produce a six-wheeled truck or tractor semi-trailer unit of the type formerly made by the Trailer Transportation Company. No fifth wheel is used on the truck itself, and no draft is transmitted through the body itself, a pivoted draw-bar pulling the cradle above the trailer fifth wheel upon which the rear end of the body rests. The rearmost wheels trail accurately with the middle wheels, and the vehicle backs correctly. It will turn in the same radius as the truck alone.

Rubber Market Quiet

With the exception of a slight reduction in price since our last report no particular features have been noted in the rubber market during the past four weeks. Buying continues in small lots for current consumption.

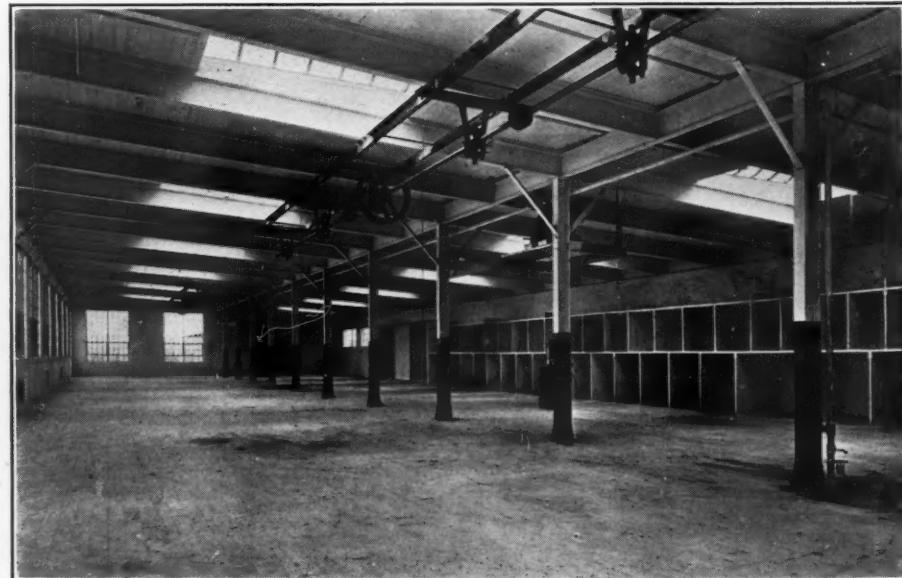
Quotations on August 9th were:

Up-River—	Cludad—
Fine	E'k
Coarse	a ..
Island—	Trinidad—
Fine	E'k
Coarse	Nominal
Cameta	
Cauchito Ball—	Africans—
Upper	Massal, red
Lower	Red C'go
	E'k C'go
Centrales—	Soudan—
Corinto	Niggers
Esmeralda	Gambia, prime..
Guatemala, slabs	a ..
Mexican—	East India—
Scrap	Smk. sh'ts
Strip and scrap	62 a 62 $\frac{1}{2}$
Guaynabo—	Ceylon—
	Bis sheets
Balata—	Strip and crepe
Sh't	62 $\frac{1}{2}$ a 63
	Fontianac—
	Prime plantation 6 $\frac{1}{2}$ a 7
	Palembang—
	Inner tube

DOMESTIC SCRAP RUBBER

Tires—	Automobile	4 $\frac{3}{4}$ a ..
	Bicycle, pneumatic	3 a 3 $\frac{1}{4}$
	Wagon and carriage, solid	4 $\frac{1}{2}$ a ..
	Inner tube	12 a 14

I've known big buyers to have confidence in a new concern simply because the office boy at the door was polite.



The Daylight Addition of The Russel Motor Axle Company

This new addition of the Russel Motor Axle Company, of Detroit, Mich., is of brick and concrete; size 60 x 192 ft., approximately 11,500 sq. ft. This makes a total of 26,000 sq. ft. of floor space in the plant. This company is a very large maker of internal-gear axles, and has been in the business since 1909.

Trucks Show Economy Over the Horse and Railroad When the Only Profits Must Come From the Handling of the Merchandise



THE one thing that has prevented the universal adoption of motor haulage, transfer and delivery, has been the question in the mind of the over-cautious business man as to whether there would be any saving in moving his goods by mechanical rather than animal power. It is the same old story over again—the substitution of engines for horseflesh. The adoption of the motor-driven truck in place of the horse-drawn wagon is the last step in the introduction of mechanical methods, this displacement having taken place in nearly every other line.

It seems to the writer that nowhere is there stronger proof of the ability of power-driven vehicles to do better and more economically the work of horses, than in their use by expressmen and transfer companies, and by railroad companies, for handling freight, places where the actual returns on the money invested are for transporting commodities from one place to another. If the man whose business it is to move things from point to point discards his horses and does this work with commercial cars, this is practically positive proof that the latter vehicle is more efficient and better for this work than his former horse methods. If this is not the case, why have the largest express companies practically eliminated the horse from their service? Why have innumerable transfer companies discarded the horse in favor of the motor, and how does it happen that individual expressmen have been able to purchase vehicles and equipment of many times the initial cost of the former horse outfit, and pay for it out of the business that they do with the machines?

There should be no conflict between the railroads and trucks used for hauling freight in a local way between nearby towns, or for comparatively short distances, of say not over one hundred miles, for this is a field that the railroads always claimed did not pay them. That it does pay to handle this kind of freight by truck has been repeatedly demonstrated, and this, of course, is largely due to the fact that crating and numerous handlings are eliminated.

Competing With the Railroads

At the present time there are three Mack trucks hauling freight between Paterson, N. J., and New York City, carrying at the rate of 360 ton-miles per day per truck, or 27,000 ton-miles per month for the three trucks. These are operated by the Paterson & New York Motor Express Company, and the business was taken direct from the railroads, that were doing it at a loss. The company claims that the trucks have reduced delivery time four-fifths, and have practically eliminated loss from breakage, and that they are showing a profit. Shippers who were always dissatisfied when their goods went by rail are now enthusiastic patrons of the motor truck service.

This particular company operates 4 five-ton and 1 two-ton truck, all fitted with

standard express bodies. The routes have been so arranged that there is no waste mileage, and the trucks are kept in continuous operation. The trip one way is 19 miles, and the trucks cover on an average of 60 miles a day, including delivery. Each vehicle is on the road 14 hours a day, practically 25 days out of every month. A factor which results in low ton-mile costs is the fact that every truck carries its capacity load. The trucks leave Paterson on schedule time as follows: 4, 6 and 12 in the morning, arriving at New York City at 6.30, 8.30 a.m. and 2.30 p.m. They leave New York City at 3.30 and 5.30 p.m., arriving at Paterson at 6 and 8 p.m. As will be seen, the run takes 2 hours and a half, not occasionally, but every trip.

Now that we have the modern road engine, the road is the logical place for short haul work, that is, short haul work for the railroad, but long haul work for the truck. Owing to the inherent disadvantage of short distance shipment by railroad, this business of hauling by trucks must in the nature of things increase from year to year.

Long-Distance Furniture Moving

This is a line of work which has also been satisfactorily handled by trucks instead of train. It is quite common for families to move from New York City to Philadelphia by motor. Morgan Brothers Company uses 1 four-ton, 2 three-ton, 2 two-ton, and 1 one-ton Mack trucks, equipped with moving van bodies. They are on the road all day or all day and all night if necessary. All kinds of roads are negotiated, as the goods are not only carried 100 miles over the road, but delivered at the door with but one packing and one unloading.

Exclusive of depreciation and insurance, this company finds the cost of hauling per mile to be .236 for a four-ton and .206 for a two-ton truck.

Brewers Use Trucks Instead of the Railroad

Brewers were among the first to recognize the possibilities of motor driven equipment, as they have many long suburban hauls. The advantages of the truck in preserving the product, and getting it to its destination while still cool, have been dwelt on at different times, and it is sufficient to say that the well-known brewers of New York City, and in fact all large cities are all fleet users. Suburban shipments by rail have been almost discontinued. Deliveries during the hot summer season are uniform and assured, while with horses or the railroad they were anything but certain. They are also large users of electric trucks, nearly all the breweries being equipped for doing their own charging at night; in fact, the writer is familiar with breweries that have so complete an equipment that they can practically build a truck if necessary in their own establishments. Ice packing of the beer for suburban shipment by railroad is now a thing of the past.

The very fact that private enterprise by means of trucks is getting some of the freight transportation business of the railroads, has caused the railroad authorities to look into the possibilities of motor driven vehicles, which has resulted in their adoption by the railroads themselves, as a solution of certain of their transportation problems.

Express Companies Largest Users

Among the largest users of commercial cars are the express companies, many of which are motorizing practically their entire equipment. In Philadelphia and vicinity not a single horse is used by the Adams Express Company. This company ordered its first Autocars, 11 of them, in 1909, and tried them out until 1911. They purchased 64 of this one make in 1912, 113 in 1913, 87 in 1914, and 16 in 1915, making 291 Autocars,



Six of the Fifteen Vulcan Trucks in Use by the Adams Express Company
Lined up for business in Long Island, N. Y. The Adams Express Company is putting on ten more of these machines of four tons capacity each

said to be the largest single fleet of one make truck in the country.

Cost figures are very difficult to obtain from the express companies, but the fact that the horse has almost disappeared from the service of these large concerns is sufficient proof that the motor has proven more efficient.

It is not surprising therefore that individual expressmen and men who have but a single horse wagon have gradually waked up to the possibilities of the motor driven commercial car. One owner, the Hammond Auto Express, of Arlington, N. J., now using two Autocars, says: "Owing to the increasing demands made upon my horse delivery equipment in the fall of 1913, I concluded it would be necessary to put on additional wagons to handle some large contracts I had obtained for cartage. I had never used automobiles, but the nature of the work to be done made it imperative that I should give quicker service, and at the same time cover more territory than would be possible with horses." He first placed one car in service, but owing to the increased earnings resulting from the extended territory covered, a second car was purchased. This has been the history of many individual owners throughout the country.

The Moreland Express Company, of Newark, is another case of the same kind. The owners state, "Our car is doing the work of two teams, and is enabling us to give our customers much better service."

Frederick A. Anthes, of Mamaroneck, N. Y., says: "When I bought a car I began to make real money. My little car is a gold mine for me. The upkeep cost is nothing to what the car earns."

In San Francisco, the Emmons Draying & Safe Moving Company is one of the firms in the express and transfer business that find their Federal trucks moneymakers for them, and in their order for their seventh truck, say: "The six trucks are on duty every day and are giving the utmost satisfaction. We wish we could find time to give you further and more exact information as to the good work that the trucks are doing in our business, but we are too busy."

A Growing Business

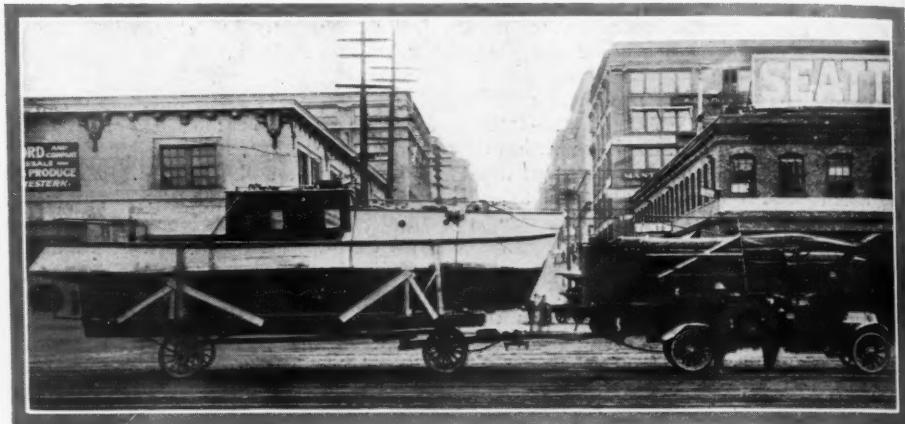
About a year and a half ago the Lloyd Transfer Company, of Seattle, Wash., made a purchase of a Federal truck. This was the first motor driven truck they had owned.

The adventure was experimental. At the present time they are operating eight of these cars, the business having grown to this extent during the year and a half.

The trucks are used around the mountainous suburbs of Seattle for hauling anything and everything that comes to the company. They compete successfully with the railroads, and it is very noticeable that nothing else in the way of transportation on the road but by trucks has ever successfully competed with railroads. In an accompanying illustration one of these trucks is shown hauling a good-sized power cruiser on a

the railroad between the two points and the 'bus line is giving such superior service that practically all of the passenger traffic between Montgomery and Wetumpka is carried on by the motor 'buses.

In addition to this line Mr. Pugh is operating a White twenty-two passenger 'bus between Montgomery and Lapine. The 'bus runs on a regular schedule, making two round trips per day, a total distance of 54 miles. As is the case with the Wetumpka run, the passenger traffic is showing a marked preference for the motor 'bus instead of the railroad.



Federal Truck and Trailer Hauling a Cruiser

Truck is owned by the Lloyd Transfer Company, of Seattle, Wash. The illustration shows one of the many uses to which the truck is put

trailer through the streets of Seattle, showing the diversified uses to which the cars are put.

That motor 'buses can successfully compete with railroads on comparatively short hauls is being demonstrated by T. N. Pugh, of Montgomery, Ala. A year ago Mr. Pugh installed his first White 'Bus of $\frac{3}{4}$ ton capacity, on a straight line route between Montgomery and Wetumpka, Ala.

At the present time Mr. Pugh is operating two White 'Buses every day over this 14-mile run. No through tickets are sold on the 'bus and must be purchased from one of the ticket offices at the end of the line. A 'bus leaves each end of the line every two hours and completes the trip in 45 minutes. They are run on a schedule and no delays are permitted.

There is one train a day each way over

'Bus Line for Florida Coast

During the summer months, along the coast of eastern Florida, the railroad service is so inadequate that the firm of Kyle, Andrews, Crim & Oliver, of Ft. Lauderdale, has seized the opportunity of installing a motor 'bus line to take care of the passenger traffic between the cities of Ft. Lauderdale and Miami, Florida, a distance of 25 miles.

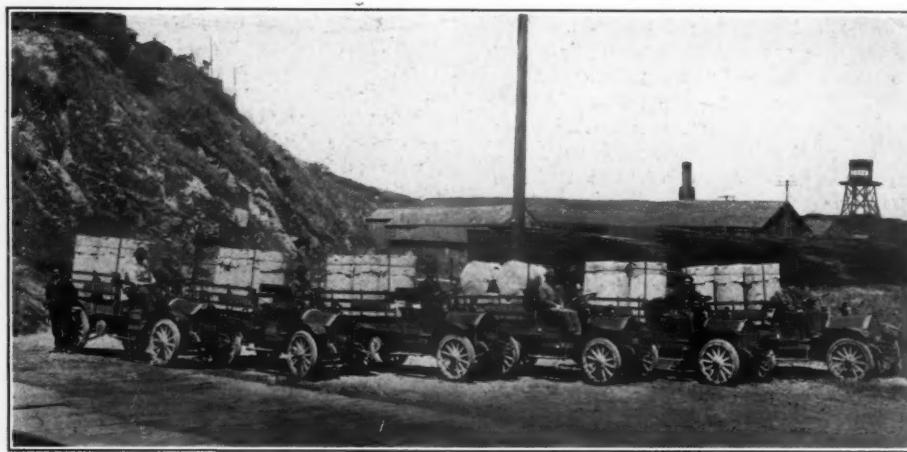
They purchased two White twelve-passenger 'buses and are operating them on a regular schedule over the above route. One of the 'buses leaves each end of the line every 2 hours, allowing a short wait after each trip.

The fact that the 'buses are carrying a full capacity load on each run assures the future success of the motor 'bus in this territory.

Furniture Moving by Trucks vs. Railroads

William E. Good Transportation Company, Dayton, Ohio, believes in long distance shipment by truck. Recently this company took a truck load of furniture to Columbus, Ohio, a distance of 70 miles, after a week's rain. Although much of the distance had to be taken on low speed, owing to the almost impassable condition of the road, the Avery truck performed well, the time on the road being 24 hours. This furniture shipment would ordinarily have gone by railroad.

In Peoria, Ill., the Wahlfield Manufacturing Company uses its Avery truck for hauls from Peoria to Pekin, to Washington and to Tramont, the latter being a 40-mile round trip. They state that these trips save crating of material and allow hauling direct to the job, thus saving the customer having to haul and uncrate.



Federal Truck Used by Emmons Draying & Safe Moving Company, San Francisco

The CCJ has most readers because it gives most information

AUGUST 15, 1915

and
rvice
traffic
ca is

oper-
'bus
The
two
of 54
mpka
ng a
is in-

A Hard Mountain Haul

In Madera, Cal., the Big Auto Stage Company are hauling all kinds of material with Adams trucks up to the Sugar Pine Lumbering Company's mills in the mountains, a distance of 80 miles one way. The road from Friant to Sugar Pine of about 60 miles is the roughest kind of mountain climbing and nearly all upgrade. The haul is so hard that a set of sprocket chains lasts only about 3 weeks. The trucks have now finished a season of this long distance work, which has saved the company much money over other methods of getting the material to the mountain camp. In the accompanying illustration the trucks are shown with their crew.



Some Load of Furniture on a 125 Mile Run Being Hauled by a Sandow Truck



A Little Group of Variety

The lower left shows the twenty-two passenger White 'bus used by the California Hot Springs Transportation Company. At the right is the outfit used by the Big Auto Stage Company, for hauling material and crews to the mountain tops.

The Sandow Truck Company, Chicago, Ill., states that a large number of its trucks are competing with railroads in long distance hauling of furniture and household effects and that customers usually prefer to have goods hauled by truck rather than railroad when the distance is less than 150 miles. One of these trucks loaded with furniture, while on a 125-mile run, is shown in one of the accompanying photos.

In Minneapolis, goods are hauled to Anoka, a distance of about 22 miles one way, in a few hours, while by freight it would take from 3 to 5 days, owing to the amount of switching and checking at both ends which the railroad seems to do.

There are many places where trucks are being used to advantage for hauling sugar beets to the factories, hauling tomatoes and fruit to canneries, a service in which speed of transportation is all important. It pays to haul hay up to distance of 25 miles. Especially useful are trucks in gathering cream and milk from various farmers and from sub-stations where prompt service by railroad is next to impossible.

In many mountain districts ore is commonly hauled by motor trucks from places where it would be too expensive to haul by railroad. Passengers are also carried to out of the way hamlets and mountain towns by trucks with railroad like speed and on schedule. This is largely true of

districts in the far West, where 'buses are used as feeders to the mountain railroad lines and also in competition with them.

'Bus Line Connects With Railroad

The California Hot Springs Transportation Company, J. A. McFayden, proprietor, has been operating White Trucks for the past four years between California Hot Springs and Ducor, handling all passengers, mail and freight between these points, a distance of 25 miles.

This motor transportation line is one of the few in this country that is operated officially in connection with a railroad. The 'buses meet all Southern Pacific trains at Ducor and have never failed to make their schedule. Tickets covering round trip passage over the route are sold at all valley Southern Pacific offices.

The company started in with one White 1½ ton truck, which frequently made two round trips per day over the route and often handled twenty to thirty passengers beside one to two tons of freight. The second year another 1½ ton White was purchased to take care of the increased business. This season there has been added to the equipment a White twenty-two passenger 'bus, herewith illustrated.



Saurer Trucks of the Weber-McLoughlin Company Eliminate Three Yards

Two instead of three coal yards are all that are required by the above company on account of the use of the fleet of Saurer trucks. This makes an investment saving at once of \$150,000, to say nothing of the daily operating costs of such a yard.

The machines have been thoroughly demonstrated on this mountain run, having been in constant hard service over roads of the worst character and grades as steep as 15 to 20 per cent.

The advent of these trucks has been a boon to this part of the country, like other mountain sections, heretofore practically isolated, due to dependence upon horse transportation. It is estimated that these trucks have taken the place of from two to four two and four-horse stages and they are doing the freight work of from two to

started in 1911 to meet the demand for transportation with automobiles and their business and equipment has grown steadily since.

The California oil country has spread rapidly over a large territory, faster than good roads could follow, and the work of the 'buses is by no means easy. Each car travels from 80 to 120 miles per day.

Mr. Thompson says: "We started with one White car and now have fourteen. Our lines out of Bakersfield are being operated to the Kern River and the West Side oil

using them for transferring freight from inward to outward freight houses. They are a great assistance to shippers and receivers in the expeditious handling of such freight.

Previous to the installation of trucks the railroad was using about forty-seven shifting freight cars, which were charged up to the freight department at \$.45 each per day, or \$21.15 per day. They now use only one "shifter" at \$.45. The trucks go between houses that are from one-fourth to one mile apart.



Electric Fleets Are Much in Evidence in the Express Business

four eight-horse teams. Prior to the installation of motor trucks it took about four days to get a load of freight from the railroad station to Hot Springs. Now freight is daily delivered to Hot Springs in about 3 hours' time. In fact, freight shipped from San Francisco is delivered at the Springs the following day. And as for passengers, the long day's trip has been turned into a most enjoyable 2 hours' ride. The mail delivery service has been proportionately improved by the use of motor trucks.

'Buses in the California Oil Fields

In the great oil field country around Bakersfield, Cal., Thompson & Smith have substituted for the more picturesque stage coaches, an extensive equipment of White passenger cars and motor 'buses. In this bustling oil country there is great need for speedy transportation between towns and they could not wait for electric lines or railroads to develop. Thompson & Smith

fields, connecting with the towns of Oil Center, Taft, Maricopa, McKittrick, Fellows and other small towns. Lines out of Fresno run to Kingsburg and intermediate towns on the north. We are now contemplating putting in a complete suburban motor bus line to all the outlying districts around Fresno. Cars have already been ordered for these routes and will be in operation in about 60 days. We are also installing a motor bus line from Fresno to San Francisco and from Fresno to Los Angeles. This will be a beautiful trip during the summer months."

Electric Trucks Reduce Cost of Handling Broken Lots of Freight for Railroad

Handling what traffic men call "broken lots" is a big problem for the railroads. In Boston the New York, New Haven & Hartford Railroad Company has overcome to a very considerable extent this problem by the use of heavy duty G.V. electric trucks,

Previous to employing the trucks, the work was as follows:

Inward freight was unloaded from car to freight house; later the shifter switched in and the above load was loaded into it, together with other goods for outward points. The shifter was then switched to the outward freight house, where the car was unloaded and sorted; then shipments were loaded into the car for the point of destination.

With trucks the inward car is unloaded and the outward bound goods left near the door. Then the truck takes the load to the outward freight house, where it is loaded directly into the car for its point of destination.

Each truck has at present a driver, a checker and two freight handlers. The management is considering having only a driver and checker on the truck and having the freight handled by the men at the respective freight houses.



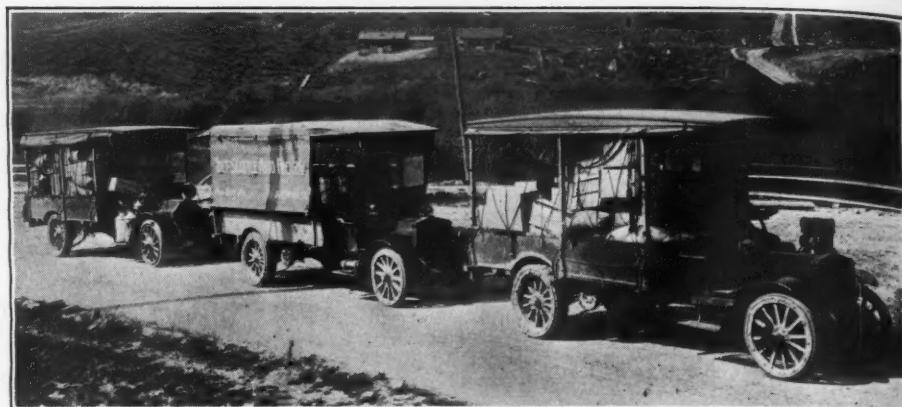
A Few Typical Bodies Used by Express and Hauling Companies

The CCJ leads in circulation, advertising and prestige

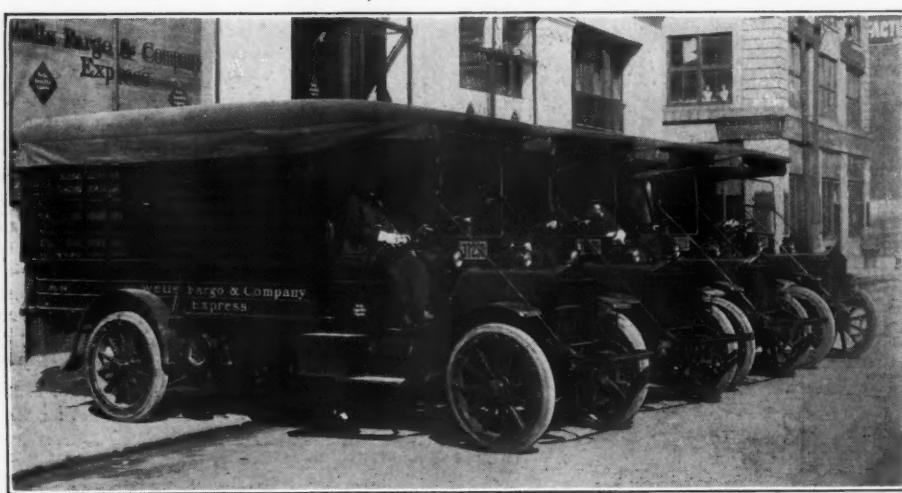
These trucks have a clear loading space of 6x15 ft., with stakes, side opening, high seat and three bow hoods. They are equipped with Edison batteries. With the above loading space on mixed freight, the trucks carry from 9200 to 10,000 lbs. conveniently. They are handling about 75 tons per day with a mileage per truck of 14.

The management is considering in the near future transferring between the Congress Street and the North Station, a distance of about 2 miles, provided the present proposition continues to work out satisfactorily. They are to garage and care for these trucks themselves, also charge from their own charging plant.

The first two General Vehicle trucks were placed in service November 1, 1913,



Federals Used for Express Business in Seattle, Wash.



Part of the Federal Outfit Used by Wells Fargo & Co.

and so far they claim their mechanical upkeep, exclusive of tires, has been less than \$1 per month, as shown by the following figures:

Feb. 27, 1914—6-70 volt 6 C. P. Base	
Lamps	\$.76
July 3, 1914—1 F. C. Slate Circuit	
Breaker, Auto No. 2	5.76
Aug. 27, 1914—2 lbs. Mica Washers;	
3 Mica Tubes, Auto No. 1	1.48
Dec. 15, 1914—2-70 6 C. P. Base	
Lamps .....	.56
March 30, 1915—Repairing Spring,	
Auto No. 1	8.40
Total	\$16.96

It may be said that probably no other line of work gives the cars as long hours, as irregular hours, or the owners as little time to give the trucks the proper attention and overhauling as the express and transfer business. From all parts of the United States we find that trucks are making good not only in the sense of being more rapid, but from the standpoint of economy. If they are successful in this line of business, where the profit must be made on the moving of merchandise or passengers, the thinking business man cannot but realize that trucks will eventually dominate other fields where hauling is merely incidental to the business and here also can do the work better and be made to show a profit.

Gramm-Bernstein Company, Lima, Ohio, has received an order for \$1,000,000 worth of heavy trucks said to be for the Russian government.

Union Garage, G Street, between Sixth and Seventh Streets, Washington, D. C., is now occupying its new six-story, fireproof building, which is entirely devoted to the storage of cars, and repairing of electric delivery cars and trucks. The equipment of this garage is up-to-date in every detail, the vulcanizing department being capable of handling either pneumatic or solid tires, gasoline tank having capacity of 2000 gallons, etc. One floor is devoted entirely to electric vehicles, and every department is in charge of expert men with a competent staff of assistants. The officers are Myron M. Parker, president; John Ridout, 1st vice-president; C. Walter Hoover, 2d vice-president and general manager; Louis Beyer, Jr., secretary-treasurer, and M. M. Parker, Jr., assistant secretary.

American Dadco Company, Detroit, has been incorporated with a capitalization of \$200,000 for the purpose of manufacturing automobile and motor boat starters. Incorporators: John F. Troy, Charles L. Seymour, Evan P. Heaton and William F. Carroll.



Truck and Trailer for Ore Hauling

For lack of a railroad, the Mineral Products Company, Utah (subsidiary of Armour & Company), had built this special seven-ton steel trailer body for mineral hauling by the Variety Manufacturing Company, of Chicago. It is to be used as shown, with a Jeffery Quad, at the Alunite mine in the Rocky Mountains, twenty-five miles from the nearest station.

Buffalo Moves and Hauls by Commercial Car

The Experience of Some of the Successful Buffalo Operators of Motor Trucks in the Express, Carting and Moving Business

By GEORGE W. GRUPP

THE motor truck made its first appearance in this field of operation in Buffalo about five years ago. Since then three score and more firms and individuals have adopted the motor truck. And it is not far distant when all the horse-driven vehicles in this occupation will be isolated. This is no mere guess statement, but is acknowledged by the moving, carting and express men themselves. They say that the public insists on the use of motor trucks or they won't deal with them. Another man says, "The cutting of prices has been so great, competition so keen, that a man is forced to buy a truck or get out of business."

It is safe to say that nearly one hundred and fifty persons earn their living by directly or indirectly operating one or more trucks in this work. Very few, however, even try to keep an itemized cost of operation. But there is one thing they do know when you ask them—they are all making a living.

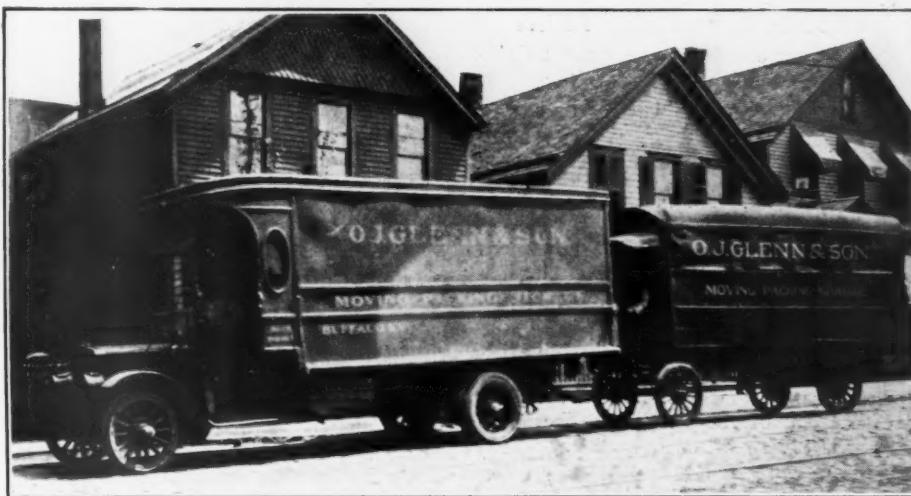
Those movers and cartmen who make long distance deliveries have a system all their own which they call a "combination." Not a trust; it's a system that makes the truck double its earning powers. For example, suppose John Smith of Buffalo wanted to move his household goods to Derby on the lake shore on a certain date. As soon as the truckman learned this date, he would immediately get in touch with Derby and arrange for a return load from Derby, thus the truck does not have to return empty.

In asking Mr. Joseph W. Glenn, of O. J. Glenn & Son, how much a person actually saved by moving by truck to the country or a nearby city, he said, "In the first place we deliver our customer's goods from his old house to his new house. Suppose a man called up and said he wanted to move from Buffalo to Batavia

(40 miles from Buffalo), we would charge him \$36 for our big truck, load his household goods, deliver it and unload all in a single day. Now, on the other hand, were he to ship by rail it would cost considerably more. First, he would have to pay about \$50 for packing, \$16 for carting (to the freight house and from the freight house to his new residence), a freight bill of \$9 and for unpacking \$4, or a total of \$79, all

O. J. Glenn & Son, who operate two 2-ton and one 3-ton Atterbury trucks, also a Ford delivery, itemize their cost of operating as follows:

	Per mile
Gasoline	\$.016
Oil .....	.003
Tires .....	.020
Repairs .....	.006
Wages .....	.150
Total cost	\$.195



Three-Ton Atterbury and Trailer Used by O. J. Glenn & Sons

of which does not include his hotel bills during packing, carting, time of railroad transit, carting again and unpacking and the time consumed. At a glance you can see that he is saving \$43, plus hotel bills, time, etc."

Upon investigation it was found that most household movers charged a minimum of \$15 and any distance over 12 miles an additional charge of \$1.25 per mile was made.

Keller Brothers Transfer Company, who operate one 1½-ton Autocar, one 1-ton Sampson and one two and a half ton Atterbury, have a very original way of handling their baggage and freight. As a rule, most of their baggage and freight is brought up from the freight and baggage houses to their place on West Genesee Street by six mule-driven wagons. Here the things are sorted and assigned to the different trucks which are routed for long distance hauls while the mule teams care for the nearby deliveries. This firm claims that their trucks are able to do the work of three mule teams on anything over a mile.

A very versatile truck is the 5-ton Pierce Arrow owned by the Buffalo Cold Storage and Carting Company. When it is not actively engaged carting large rolls of paper 6 ft. long and 2½ ft. in diameter from the warehouse to one of the local newspapers, it may be seen doing duty carting produce, staple goods or most anything. The carrying of those paper rolls is its regular business, twelve trips a day in addition to its other duties. Before they operated a truck it required three teams to carry the paper to this newspaper each day alone, and do nothing else, also six men required. Now the same work is being done with this lone truck and three men and it performs other duties besides.

Here is a sample of one of its additional duties. Recently this truck delivered 55 barrels of salt a distance of 1¼ miles each way in two trips in one hour; in other



Five-Ton Pierce-Arrow Loaded With 12,640 lbs. of Sugar

Owning by the Buffalo Cold Storage and Carting Company. This truck displaces three teams and six men every day, in hauling large rolls of paper from the warehouse to one of the local newspapers

The CCJ has most readers because it gives most information

words, it covered 5 miles, loaded and unloaded 55 barrels of salt in two trips in the space of one hour—a feat that would have required nearly four teams to do the same work in the same time.

The cost of operating this truck is as follows:

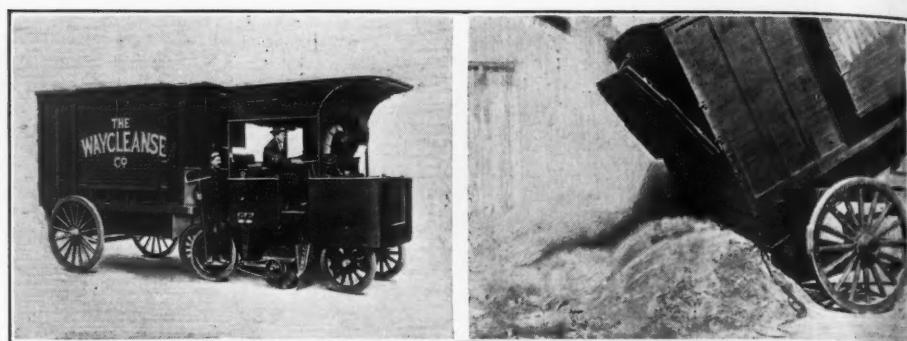
	Per mile
Gasoline	\$.030
Oil .....	.007
Tires .....	.019
Wages*** .....	.200
Total cost	\$.256

***One driver and two helpers.

Each week all the parts are inspected and all the old gasoline and oil are removed, so that the first of the week the machine starts out with a fresh supply of oil and gasoline.

THE "WAYCLEANSE"—A NEW SUCTION STREET CLEANER

The illustrations show a new street cleaning apparatus which is built by the Way-Cleanse Company, of Sandusky, Ohio. This machine is so adjusted as to adapt itself to all kinds of pavements, being as efficient on the uneven pavement as on the smooth asphalt pavement. The machine is made in two sizes; the large machine is provided with a footboard to carry a helper. When the machine is working on very uneven pavements, the holes in the pavements that are beyond reach of the broom are swept out by the helper. Any heavy litter on the streets is picked up by the helper and deposited in a receptacle that is provided on the front end of the dirt box. The small sweeper is to be used during the day where traffic is so congested as to make the work for men too hazardous to be of value.



Two Views of the "Waycleanse" Sweeper

The left shows a side view of the sweeper. It has a capacity of 12,300 sq. yds. per hour. The dirt box is detachable. The other illustration shows position of the dirt box when dumping. The dirt box is taken to the dump by the sweeper or by a team of horses.



The "Waycleanse" Sweeper

Front view of machine, showing the immense suction fan which delivers the dirt and dust to the dirt box in the rear.

The machines are usually run tandem, consisting of a gutter machine having a capacity of 9½ ft., while the sweeper that follows has a broom 7½ ft., making a sweeping capacity of 16½ ft., 6 in. being allowed for lap.

The speed of the machines is governed by the condition of the pavement. If the pavement is uneven and very dirty, the speed is from 2½ to 3 m.p.h. However, if the pavements are in good condition and swept regularly the machines are very efficient at 6 m.p.h.

A recent demonstration of two sweepers was made on the streets of Sandusky during June, over a 3-mile course on brick and asphalt pavement. One mile of this was in the business section, the pavement being of brick, and 2 miles was asphalt pavement and in a residence section. However, the traffic on the 2 miles is very heavy as the streets lead to the business section. The business section was swept daily. At the first sweeping over this section, the amount of dirt gathered by the machines was 2¾ yds. At the fifth sweeping, the amount gathered was ¾ yds.

The 2 miles of asphalt pavement was swept every other day and at each sweeping the amount gathered was 2½ yds. over the 2 miles; 1¾ yds. of this amount of dirt was taken out of the gutter by the gutter sweeper. There was no hand labor employed during the day to pick up the droppings on either section.

This company will also construct street car track sweepers. The sweeper parts of this machine are the same as the regular street sweeper. These parts will be mounted upon car trucks and operated the same as a trolley car. The advantage of this sweeper over the regular street sweeper is greater efficiency and greater speed. The conditions of a car track and the roadbed are almost constant and the fibers in the broom will wear in such a manner to clean out the groove of the rail.



From Grove to Consumer

This Commerce truck has been in operation for over a year in the service of the Coahuila Fruit Company, between Winterhaven and Tampa, Florida, and, as shown in the photograph, is operated under the most trying conditions. The roads are deep sand and the orange grove in which the truck is compelled to operate is, as shown, almost impassable for teams at all times, on account of the depth of the sand. The distance operated is about twenty-eight miles and the truck makes from three to four trips daily over these roads.

The Post Office Department, Washington, D. C., in order to provide motor mail delivery service over an area within a 25-mile radius of all the large cities, will add 105 additional motor trucks. The total aggregate mileage of the routes is 5500 miles, and of the routes selected for these new trucks forty-four are in Oklahoma, twenty-eight in Georgia, nineteen in California, eight in Texas, three in Florida, two in Pennsylvania, and one in Louisiana.



U. S. Motor Trucks Built in Four Sizes

THE United States "heavy service" trucks are built in four sizes with normal load capacities of 2, 2½, 3 and 4 tons. Each size is a separate unit especially designed to carry its normal load. All models are uniform in their design and construction and the various units of the chassis are well balanced.

Engines

The engines on the two smaller models are of Continental make, four-cylinder, four-cycle, water-cooled; bore is $4\frac{1}{8}$ in. and stroke $5\frac{1}{4}$ in. The two larger models have engines with a bore of $4\frac{1}{2}$ in. and stroke of $5\frac{1}{2}$ in. The smaller engines have cylinders cast en bloc and the horsepower rating is 27.2, while the larger engines have the cylinders cast in pairs and have a rating of 32.4 h.p.

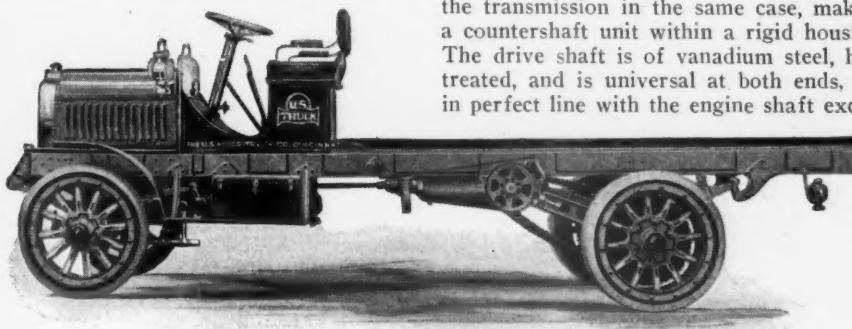
Lubrication is by combination force feed and splash system, and ignition is by a Bosch high tension duplex magneto and dry cells with lock switch on the dash. Both systems use the same set of spark plugs, which are S.A.E. size and thread.

Radiator

The radiator is of the horizontal square tube core type, the outside shell being 18 gage, riveted and soldered. It is mounted on a cradle suspended between four coil springs and is seated in the cradle on a cushion of cotton belting treated to keep out moisture. It is secured by four studs in the bottom of the radiator through the cradle. It is braced fore and aft by a rod to the dash, which is pivoted at both ends.

Engine Suspension

The engine is suspended on a rigid sub-frame which is supported between vanadium coil springs at the forward end to absorb road shocks. The rear end is supported by



Side View of United States Chassis

All the models are of uniform design and construction, so this one illustration suffices for all models

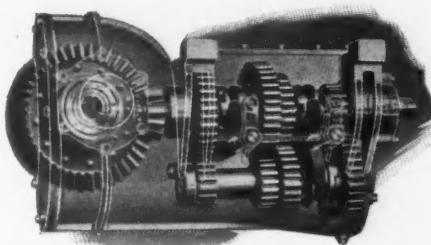
a 5 in. diameter ball joint, resulting in a flexible three-point suspension.

Clutch

The clutch is of the self-contained cone type, faced with specially tanned leather. The surfaces are of large diameter and width.

Transmission

In the transmission, the drive gears are not shifted in order to change speed. It is of the sliding clutch type with gears always in mesh and provides three speeds forward



Phantom View of United States Transmission

Showing jaw clutches for engaging the various gears

and reverse. The coupling of the driving shaft to the driven shaft is accomplished by means of a heavy dog clutch which slides on the squared portion of the driven shaft, meshing with a dog clutch cut integral with the gear. On direct drive the movement of all gears ceases and the transmission is practically eliminated. Bearings are ball and roller throughout and the transmission is provided with a locking device which prevents the meshing of two clutches at the same time.

Differential and Drive Shaft

The differential gear is combined with the transmission in the same case, making a countershaft unit within a rigid housing. The drive shaft is of vanadium steel, heat treated, and is universal at both ends, but in perfect line with the engine shaft except

under distortion of the frame. The universals are packed with grease and covered with steel housing and leather boots.

Jackshaft

The jackshaft is of heat treated vanadium steel. Jackshaft bearings are S.K.F. double row balls. The jackshaft housings are cast-steel with internal ribs bolted to the transmission case. The jackshafts, with bearings, brake drum and sprockets, may be removed from the car in a few minutes.

Steering Gear

The steering gear is of the heavy worm and sliding block type and may be located on either the right or left side of the chassis. The rim is 18 in. in diameter and spark and throttle levers are located above the steering wheel.

Prices

The prices of the various models (chassis with driver's seat and standard equipment) are as follows: Model E, two-ton, \$2550; Model G, two and a half ton, \$2750; Model D, three-ton, \$3200; Model F, four-ton, \$3550.

KISSEL HAS NEW TRUCK

That KisselKar trucks will hereafter appear in seven sizes—adding one model to the line—is the official announcement from the Kissel Motor Car Company, Hartford, Wis. The capacities will be 1000 lbs., $\frac{3}{4}$ to 1 ton, 1 to $1\frac{1}{2}$ tons, $1\frac{1}{2}$ to 2 tons, $2\frac{1}{2}$ to 3 tons, $3\frac{1}{2}$ to 4 tons and 6 tons.

The 1000-lb. delivery is the new member of the group and marks the entry of Kissel into the light commercial car field. It is, therefore, attracting a lot of attention in the trade. The stripped chassis weighs 2200 lbs. and the length over all is a little more than 14 ft. It carries a new Kissel-built block motor of 32 h.p. The wheelbase is 115 in.

Aside from this new model probably the most interesting feature of the Kissel announcement is the adoption of a worm drive rear axle on the medium sized models. The worm is of David Brown construction.

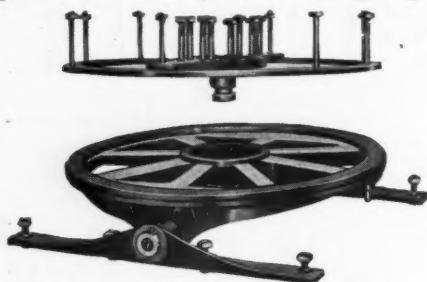
All the trucks have Kissel-built engines. The two smaller sizes have 32 h.p., the next two a 36 h.p. plant, cast en bloc. The $2\frac{1}{2}$ to 3-ton has 40 h.p. and the larger sizes 50 h.p. engines.

The Kissels are presenting as features of the truck line several standard body designs, including a street sprinkler and flusher, dumping wagon, fire apparatus, ambulances, police patrols and jitney buses.

MARTIN'S ROCKING FIFTH WHEEL

C. H. Martin, 293 Bridge Street, Springfield, Mass., well known as the inventor of the Knox-Martin tractor, has now placed on the market what he calls his Rocking Fifth Wheel, a device designed for the purpose of attaching flexibly the forward end of a two-wheeled trailer to the rear of a truck chassis, making the truck into a tractor truck.

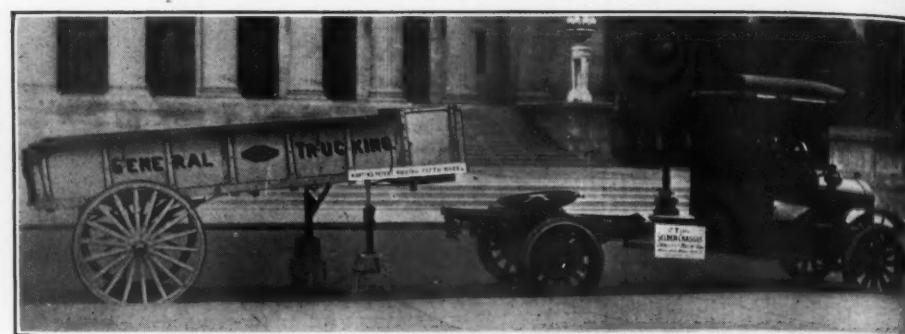
The device, as shown, is made of steel castings pivoted on a horizontal transverse axis, taking care of one rocking motion, but also allowing not only for rocking motion at right angles to this, but for a slight fore-in-aft motion. The wheel will preserve the stability of the trailing wagon

**Martin Rocking Fifth Wheel**

Showing the upper portion, which bolts permanently to the trailer, and the lower rocking wheel portion, which is mounted on the rear of the truck frame. This gives a flexible but positive connection, allowing for uneven road surfaces, still giving stability to the trailing vehicle.

on a side hill with a top-heavy load, and gives sufficient freedom in all directions to prevent binding. In the detail photo the upper section of the wheel bolts permanently to the side of the trailing member and the kingpin passes down through a hole in the fifth wheel, where a sort of latch, which grips the groove shown in the kingpin, prevents it from pulling out or lifting until released by the operator.

It is made in sizes from one that will convert a Ford roadster into a 1500-lb. tractor trailer for delivery purposes, up to a size that will enable a five-ton truck to carry 10 tons as a tractor trailer outfit.

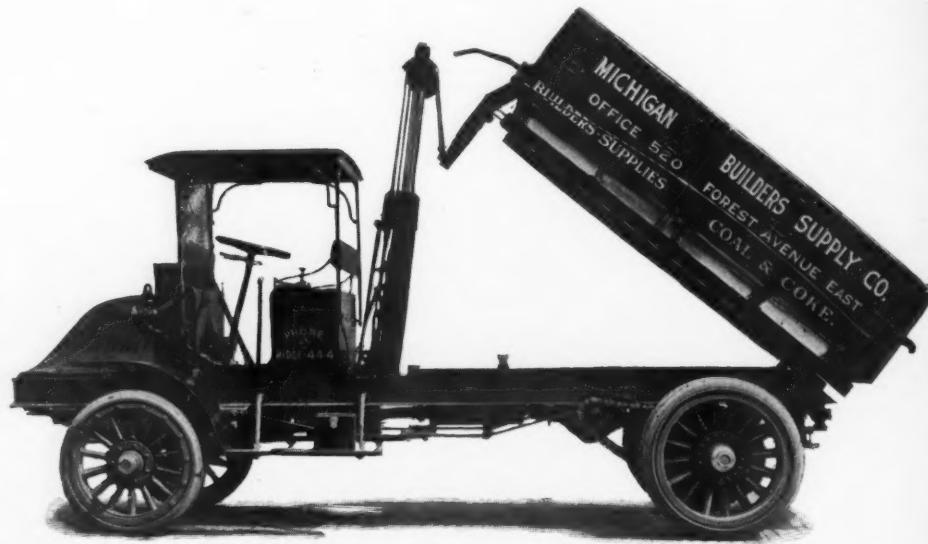
**Truck Fitted With Martin Rocking Fifth Wheel**

Showing the trailer jacked up, which allows the truck to do other duty while the trailer is being loaded or emptied. This device practically doubles the capacity of the vehicle

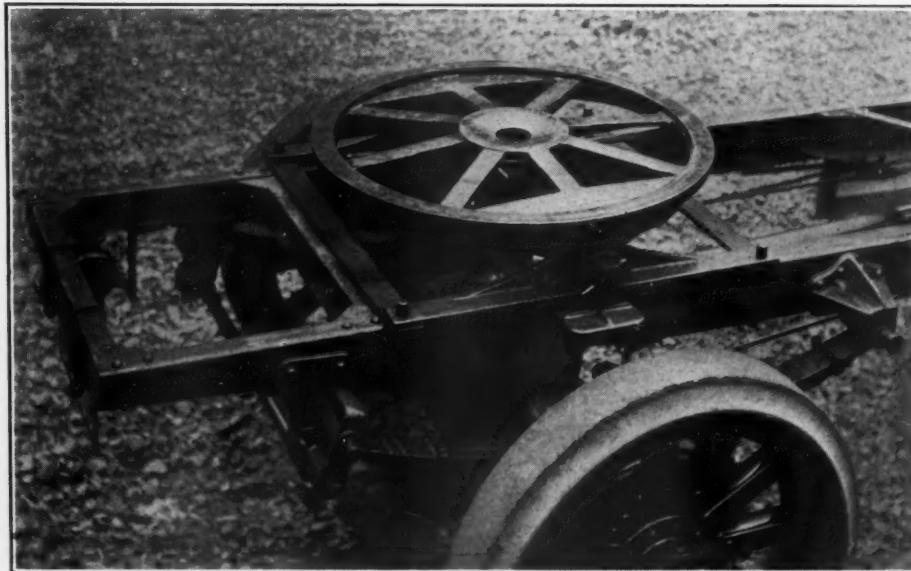
With this arrangement the trailing vehicle can be operated on steel tires and can be jacked up as shown in an accompanying illustration, and left while the truck handles other trailers. The trailing vehicle also

supplies part of the load for giving traction to the rear wheels of the truck, and it also enables a truck operator alone to back the trailing vehicle into any desired position.

These are being sold individually, in quantity, or shop rights can be purchased.

**Horner Five-Ton Truck**

With steel dump body. This is the new addition to the line of Horner trucks

**Rear of Truck Chassis Fitted With Martin Rocking Fifth Wheel**

This view shows how the device is attached on the frame of the truck. All that is necessary in connecting the trailer is to drop the kingpin of the trailer into the hole at the center of the wheel, where a latch retains it.

HORNER TRUCKS FOR 1916

In preparing for the 1916 season the Detroit Wyandotte Motor Company, Wyandotte, Mich., has retained practically all of the features that have characterized the line in the past. In addition to the line of chain drive trucks from 1 ton to 5 tons capacity, the company has added a full line of worm drive models. These trucks are of the same construction excepting insofar as the worm requires modifications. The Timken David Brown type worm is used.

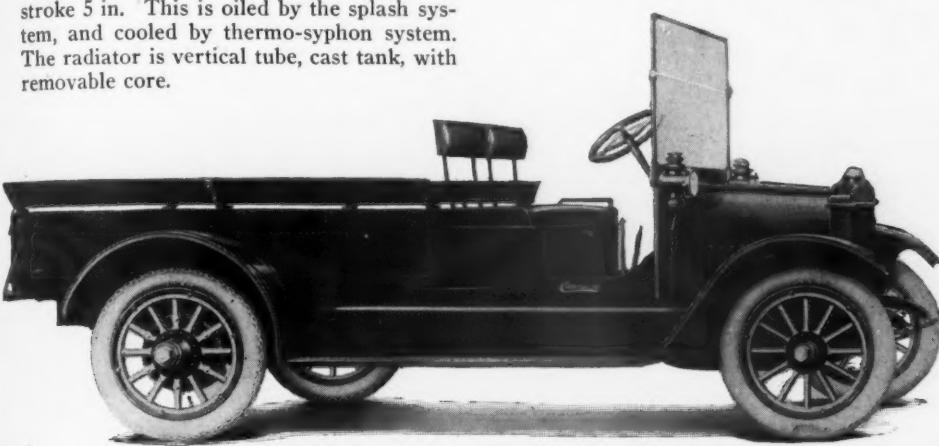
Special attention has been paid to the need of contractors, building supply people and road builders. The Horner five-ton chain drive model is specially adapted for this service, principally because of its power and strength. The equipment consists of a straight side all steel dumping body and Wood hydraulic hoist. The body is of 5 yards capacity. It may be fitted with boards having stakes to fit in the stake pockets in case the owner wishes to haul a lighter material.

THE NEW MODEL, COMMERCE LIGHT DELIVERY TRUCK

The Commerce Motor Car Company, of Detroit, Mich., in announcing the 1916 model, emphasizes on the enlarged and strengthened truck, of $\frac{3}{4}$ ton capacity, the price of which is the same, being \$975, f. o. b. Detroit. The Continental engine will be retained, the frame, springs and front axle are stronger, and the body has been lengthened.

Engine

The Continental engine, four-cylinder, monobloc, truck type, is used, bore $3\frac{1}{2}$ in., stroke 5 in. This is oiled by the splash system, and cooled by thermo-syphon system. The radiator is vertical tube, cast tank, with removable core.



New Commerce Three-quarter Ton Truck, Express Body, \$975

Continental engine, four cylinders, $3\frac{1}{2}$ in. bore, 5 in. stroke; thermo-syphon watercooling; Eisemann magneto; left-side steer; center control; 120 in. wheel base; 34×4 in. pneumatic tires

Magneto

The Eisemann waterproof, high-tension magneto will be used with fixed spark.

Clutch and Transmission

The Hartford cone clutch, leather-faced, size 14 in. in diameter, and 2 in. width, is used. Commerce trucks will have the Detroit selective sliding gear transmission of three speeds forward and one reverse, gear

faces being $\frac{3}{4}$ in. Gear shifting is center controlled.

Axles

Instead of the tubular front axle used on the previous models, this model will have I-beam section drop forged steel axle with extra heavy steering knuckles. The rear axle will have a pressed steel housing and will run on Hyatt high duty roller bearings. Gear ratio 6 to 1. Torque is taken up through torque arm, the front end being mounted on ball and socket joint, which in turn is mounted on springs. Two sets of brakes, external contracting service and in-

ternal expanding emergency, operate on rear wheels. Drive is taken through rear springs and two universal joints.

Heavy truck type steering gear is used.

Frame and Wheels

Owing to the increased wheelbase, now 120 in., with 56 in. tread, the web of the frame has been increased to $4\frac{1}{8}$ in., with extra wide flanges.

The eyes of all springs are bronze bushed. The enlarged springs are now 50×3 in. rear, and front are $36 \times 2\frac{1}{4}$ in.

Wheels are of wood, with 12 $1\frac{1}{8}$ in. spokes. Pneumatic tires, 34×4 in., non-skid on rear, with Funk demountable rims.

Bodies

"N C"—Panel top body, 84x44 in. (option of rear doors, with windows, or tail gate).

"N A"—Express type with driver's top, same size.

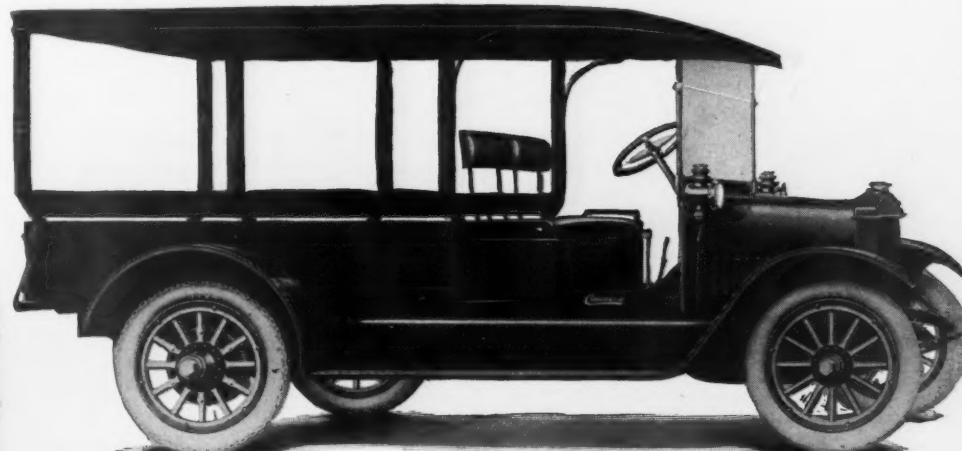
"N H"—Stake body with canopy top, with side and rear body curtains. Same size.

The hood is tapered with 12 louvers for ventilating. The gasoline tank, of 15 gal. capacity, is located under the seat.

Approximate weight, with body, 2800 lbs.

Equipment

Windshield, oil lamps, extra rim, tire rack and repair outfit, jack and necessary tools.



Commerce Three-quarter Ton Truck, Stake Body With Canopy Top

STEGEMAN MAKES ENGINE CHANGES AND ADDS WORM DRIVE

The Stegeman Motor Car Company, Milwaukee, Wis., is building, in connection with the present line of chain drive trucks, a complete line of worm drive machines with the following prices:

$1\frac{1}{2}$ -ton worm drive.....	\$1900
$2\frac{1}{2}$ -ton worm drive.....	2500
$3\frac{1}{2}$ -ton worm drive.....	3000

The Timken David Brown worm type full floating rear axle is used. Outside the worm construction there is no change made in the specifications, excepting that all engines will hereafter be hung on three-point suspension and the engine on the $1\frac{1}{2}$ -ton model will be increased in size to $4\frac{1}{8}$ in. bore and $5\frac{1}{4}$ in. stroke.



Monarch-Eureka Elevating, Side and Rear Delivery, Screw Hoist, Coal Body

This body is elevated by four screws, two at each end, by either hand or engine power. It will chute through window or openings much higher than is possible with the ordinary coal body. Coal can be delivered thirty or forty feet, if necessary. This body is built by the Thomas Wright Company, 71 Colden Street, Jersey City, N. J.

AUTOCAR CAN NOW BE HAD WITH POWER HOIST

The Autocar Company, Ardmore, Pa., announces that it will make no radical changes in the type XXI-F for the 1916 season, as the model has met with such marked success that the company feels more than justified in standardizing it.

A new feature, however, will be the new automatic power hoist for bodies on trucks used by contractors, coal dealers, etc. In developing this the aims were simplicity, reliability, reasonable cost and adaptability to standard types of bodies already used on

is located at the circumference of the gear on the winding shaft, which the operator can apply if he leaves the seat, thus insuring against accident if any one meddles with the control.

The body lowers by gravity under the control of this brake.

The body rises with load in about 15 seconds to an angle of 45 degrees, thus insuring easy delivery of the load.

The tail-gate control will be automatic, or by lever from the driver's seat, except on coal wagons for delivering by chute, so that the complete operation can be done without the driver leaving the seat.



The New Autocar Power Lift

Applied to an Autocar chassis fitted with coal delivery body. The body lifts in fifteen seconds

the car—all these features have been fully realized.

The source of power is, of course, the car engine, and is taken off the primary gear of the change gear set by attaching a separate housing containing a sliding gear and idler on top of the transmission case, in place of the usual cover plate.

This admits of the use of the car clutch as the means of connecting and disconnecting the power of the lifting mechanism. This shifting of the auxiliary gear is controlled by a separate hand lever at the driver's right hand, and is interlocked with the gear control of the car in such a way as to prevent the meshing of the auxiliary gear unless the driving gears are in neutral, and also prevents meshing the driving gears when the auxiliary gear is engaged.

When the body has reached the limit of its travel it trips an automatic release for the clutch, preventing accidental damage due to carelessness of the operator.

A ratchet brake is located on the winding shaft, which permits the body to rise, but prevents its lowering until released by the operator. The control of this brake is by a hand lever at the operator's right. As an additional safeguard an emergency pawl

COPPLE-GEAR TO MAKE A FEW CHANGES

The Couple-Gear Freight Wheel Company, Grand Rapids, Mich., will confine its efforts to a considerable extent to the front drive models. These are built in the 3½ and 5-ton sizes. Standard Couple-Gear pulling wheels are placed under the forward end, and approximately 70 per cent. of the pay load is carried on the steel shod rear wheels, which wheels are usually 64 in. in diameter, with 3½ in. spokes and 4x3 in. felloes, and are tired with double steel tires having a total thickness of 1½ in. The rear axle is of the Timken roller bearing type and standard wagon construction is followed throughout with the exception of the forward driving parts and the addition of the battery compartment, steering gear, etc. These wagons are, to a considerable extent, built up by local wheelwrights, the Couple-Gear Company furnishing the driving sets only, which consist of the two wheels in readiness for the tires, the axle with springs, the steering gear and the controller.

Studebaker Corporation has been awarded the contract for the fiscal year, commencing July 1st, to supply the executive departments of the United States Government with gasoline commercial cars.

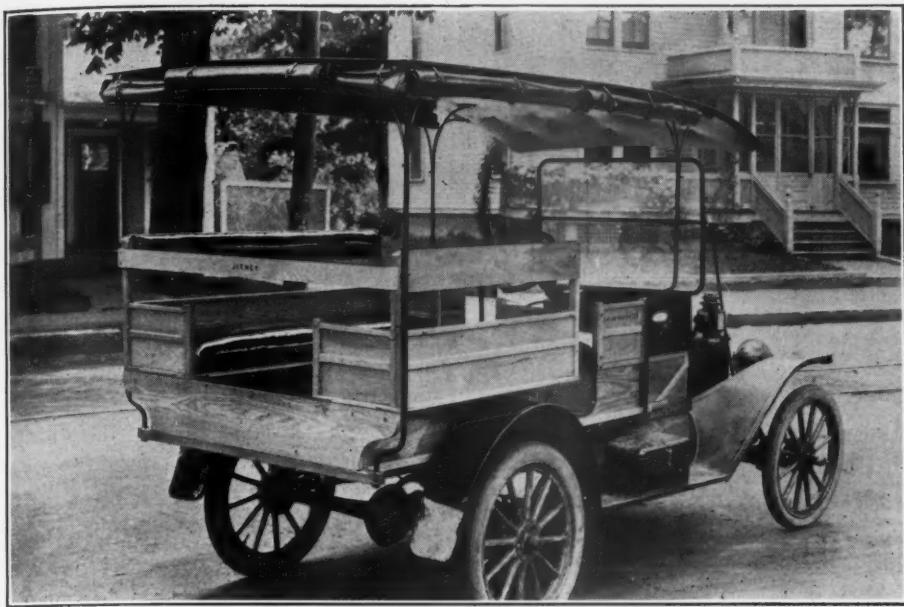
Denby Motor Truck Company has established a temporary branch organization in Paris, France, in order to handle the foreign business to better advantage. E. D. Chenvert and Beckwith Havens have been placed in charge.

A group of farmers living near McEwan, Tenn., will hereafter conduct a motor truck transportation line between their farms and Nashville. Heretofore they have been carrying their fruit to market by horse only once a week, but with the new method of transportation they will be able to make the trip three times a week. Last season, because of their inability to get the fruit to market when it was ripe, they lost approximately \$1700.



One-Ton Wichita With Combination Mail and Passenger Body

The seat within the screened compartment is removable. The other two seats accommodate three passengers—each is stationary. This truck is being used over a mail route running out of Albany, Texas, operated by S. Webb, and covers over fifty miles every day in the year, over the roughest and hilliest roads in that part of the State. The side screens slide up and down in grooves in the uprights and the rear screen doors come down to the tailgate. A folding step is used for the convenience of passengers. Curtains all around protect the passengers and mail.



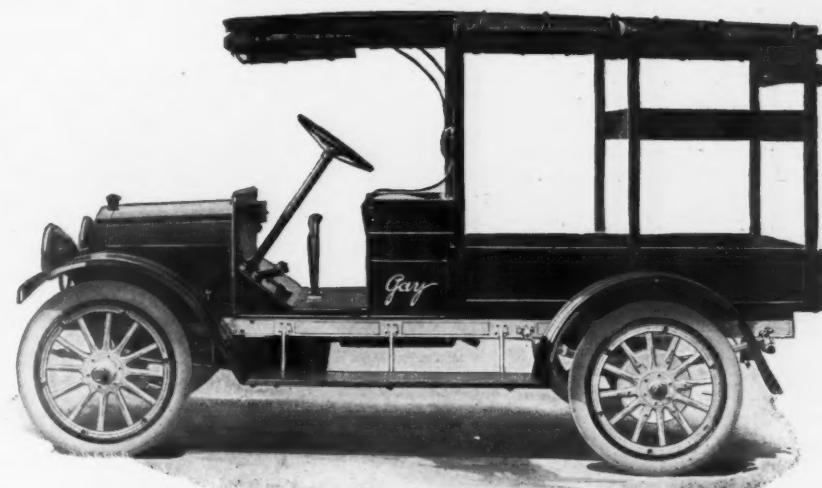
A Special Jitney Body for Ford Chassis

Built by the Wentworth-Brown Company. This body, it is claimed, can be installed in twenty minutes

SPECIAL JITNEY 'BUS BODY FOR FORD CHASSIS

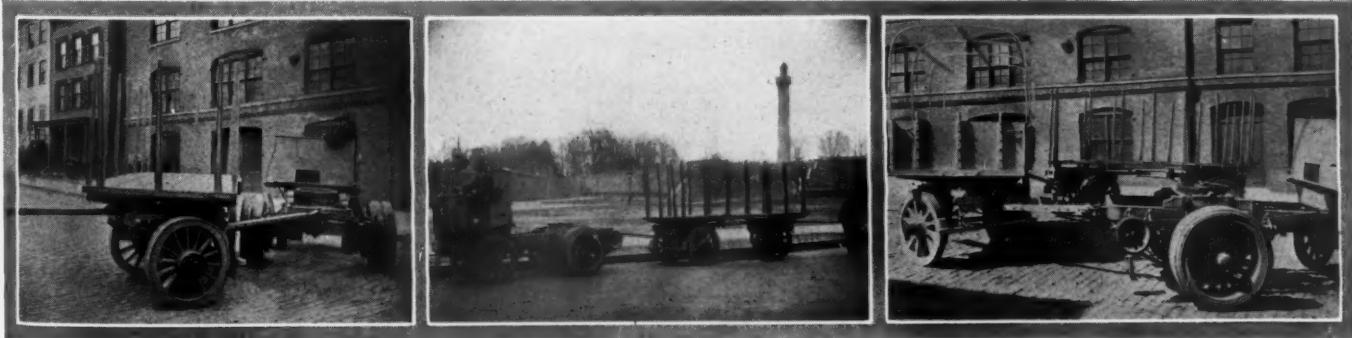
A special jitney 'bus body for Ford chassis is being manufactured by the Wentworth-Brown Company, of Boston, at Amesbury, Mass. The concern is composed of Frank Wentworth, one of the pioneers in the automobile business in New England, and Will H. Brown, a Hoosier, well known in the automobile manufacturing industry.

The Wentworth-Brown Company is taking on special body work for commercial cars, building all types of bodies, and at present are making a specialty of jitney 'bus bodies. The body which this company is manufacturing can be installed, it is said, on a Ford chassis in 20 minutes. The entrance, on the right side makes it accessible, passengers being able to board or alight from the car without interrupting other passengers or interfering with their comfort. The aisle space is 28 in. and the seating capacity nine, including the driver. The car is fitted with a canopy top, making it light and airy, but fully curtained so that it can be closed up in case of inclement weather.



Gay Model K One Thousand Pound Light Delivery Truck

The above illustration shows the latest offering of the S. G. Gay Company, Ottawa, Ill. It shows this company's latest addition, a one thousand pound light delivery, fitted with grocer's body. Brief specifications are: 20 h. p., $3\frac{1}{8} \times 4\frac{1}{2}$ in., water-cooled engine; Splitdorf ignition; Schebler carburetor; multiple-disc clutch; three-speed, selective sliding transmission; center control; worm-drive rear axle; $32 \times 3\frac{1}{2}$ in. Goodyear tires; Lavigne steering gear; semi-elliptic springs; single-unit, electric starting and lighting system, including six-volt Willard battery, head and tail lights; electric horn; complete tool equipment. Any style of body furnished to order.



Showing How Easily The Shadbolt Trailer Makes Difficult Turns

This trailer is obtainable in capacities up to thirty tons. It can be drawn from either end, all four wheels turning; a big advantage when a trailer train has to turn in a short radius. The rear wheels can be locked in a "straight-ahead" position, when only one trailer is used. The wheels have patent axle lubricators, eliminating removal of wheels for greasing. Special lock-nuts prevent the axle nuts from loosening up. To back the trailer, the rear wheels are unlocked and guided by a bar placed in the hounds. A self-adjusting brake on the front wheels is automatically applied when the trailer speed exceeds the tractor speed. These trailers are built by the Shadbolt Manufacturing Company, Flushing Avenue and Cumberland Street, Brooklyn, N. Y.

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

KOEHLER ONE-TON TRUCK, \$750, IMPROVED FOR 1916

The Koehler one-ton truck manufactured by the H. J. Koehler S. G. Company, of Newark, N. J., will be produced with added power, accessibility, general refinement and in greater volume during 1916. The most important feature of the Koehler remains that of price, \$750, the same being extremely low for a one-ton capacity truck. Structural features still used by the Koehler are a practically even distribution of load over both axles, a built-up radiator with spring suspension and thermo-syphon cooling, conventional control, an extra heavy frame and high-tension ignition.

The one-ton capacity model will be the only one produced, therefore the entire Koehler organization will remain concentrated upon a single model as before.

Michigan Hearse and Carriage Company, Grand Rapids, Mich., has been reorganized under the name of the Michigan Hearse & Motor Company with a capitalization of \$150,000. Motor hearses and ambulances will be added to its line. An addition to the present plant will be built enabling the company to make the chassis as well as the bodies for its vehicles.



Motor Truck Design and Construction Made Plain

Advantages and Disadvantages of Different Types Discussed

By C. T. SCHAEFER, Member Society Automobile Engineers

This is the seventeenth installment of a series of articles by this well-known writer, covering in a non-technical way the various constructions now current practice in commercial car design. These articles take up, in order, the general types of chassis, the advantages and disadvantages of each, illustrated by simple diagrams, and in logical order, motor construction, ignition, carburetion, cooling, lubrication, etc., until each part of the truck has been dealt with.

PART XVII

THE FRONT AXLE

THE front axle with its steering gear, knuckle, and arms is largely depended upon for the safe control of the vehicle, while it must also carry the forward portion of the vehicle and load. It must be so arranged as to permit steering the car and in order to accomplish this, the front wheel spindles are pivoted in the axle end and are held in proper relation to each other by a tie rod, which connects levers extending from each pivot. Another lever extends from either right- or left-hand pivot (depending upon left- or right-side drive) which is connected by a drag link with the steering gear.

This pivot is termed the steering knuckle and has the wheel spindle formed integral, while the levers may either be formed integral, or attached to the knuckle.

Three General Types

There are three general types of steering knuckles, known as the Elliot, Reversed Elliot and Lemoine types. In American practice the Elliot type is most extensively used and the Lemoine least. In the Elliot type the ends of the axle proper are forked and the steering knuckle is T-shaped, while in the reversed Elliot the knuckle is forked and the axle end forms a T. In the Lemoine type both axle end and knuckle form L's.

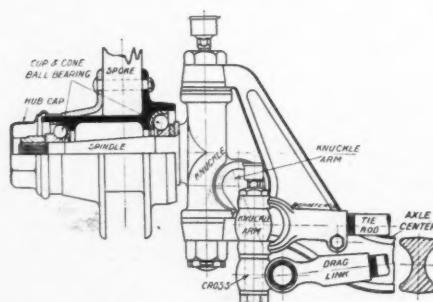


Fig. 1. Front Axle for Light Delivery Cars

The knuckle is of the Elliot type. The center of the axle is dropped. This type of axle is suitable for cars of 750 to 1000 lbs. capacity.

In practice each of these types differ somewhat depending upon the type of bearings and the method of mounting the knuckle in the axle end.

For some time it was the general impression that when the plane of the front wheel was in line with the plane of the knuckle pivot, the effect of road inequalities would not be transmitted to the steering gear. This contention led to the introduction of a type of knuckle in which the wheel center lies very close to the pivot center. The knuckle in this type, instead of having a T-shape, includes a sort of a yoke extending outside of the wheel hub to points close to the spokes and the forked axle ends are pivoted to the yokes at these points. However, this is of minor importance, since the speed of commercial cars is comparatively low and with a semi-reversible gear the road

knuckles and the one for connection with the steering gear are known as knuckle arms. These may either be formed integral with the knuckles, or attached by means of a taper and keyway, retained by a castellated nut. One prominent maker forms the spindle and levers separately so that they may be dovetailed together and retained by the pivot pin. The general practice is to attach them to the knuckles since this simplifies manufacturing and replacement.

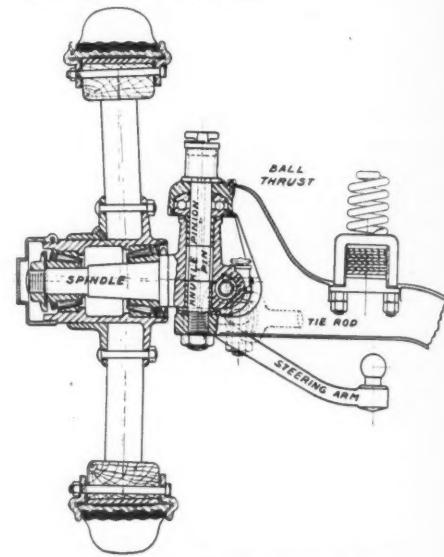


Fig. 3. Peerless Front Axle
The wheels are dished and mounted on Timken roller bearings

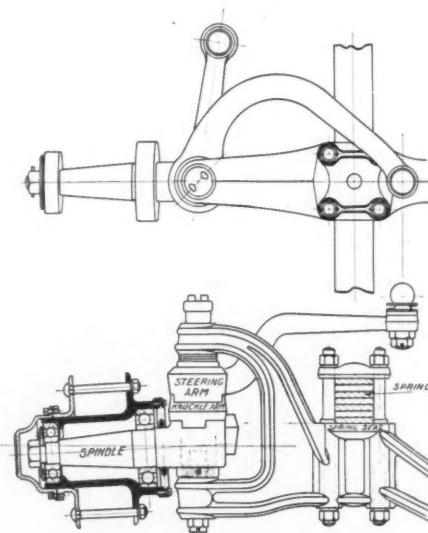


Fig. 2. The Vulcan Five-Ton Front Axle

An example of heavy vehicle construction arranged for fore and aft steering. Tie rod is located to the rear of the axle.

shocks are not transmitted to the steering wheel. One prominent maker employed this type of knuckle for a number of years, but has discarded it on a 1915 model and is now using the Elliot type.

The levers to which are attached the tie rod used for connecting the two

Owing to their importance, the knuckles and arms are always forged from a good quality of steel and heat treated. The tie rod may either be placed in front or in the rear of the axle, while the steering connection may either be arranged for cross or fore and aft steering. The arrangement of tie rod and steering connections depend upon the general construction of the vehicle and the location of the steering gear.

The Axle Proper

The axle proper may either be forged from medium carbon steel of solid rectangular section or of I-beam section, approaching a full rectangular section. Cast

steel axles are also used, while one maker of a popular priced vehicle uses cast steel ends with a round section center. These axles may also be built up with tubular centers, flat plates riveted together, or from pressed steel of channel section.

Attachment to Frame

In conventional designs the only connection between the axle and the frame is through the front springs, which with few exceptions are of the semi-elliptic type. One maker uses a full elliptic front spring and provides a distance rod to hold the axle in alignment with the frame.

Fig. 1. illustrates a front axle with cast steel center for light delivery cars of 750 to 1000 lbs. capacity. The center is dropped considerably, that is, the topmost surface of the axle bed is located considerably below the center of the wheel spindle, since it is intended for use with full elliptic front springs and pneumatic tires. The knuckle is of the Elliot type and drop forged with integral spindle and has a boss at its lower end which is provided with taper and keyway for attaching the knuckle arm. The tie rod is placed to the rear of the axle center and is attached to the knuckle arms by a clevis and bolt. The knuckles are arranged for cross steering and one clevis bolt has an extension which carries a cross to which the drag link is attached. This cross serves as a universal coupling to compensate for the angular positions of the knuckle arms and the variation in the vertical movement between axle and frame. This is necessary as the steering gear is always attached to the frame and the action of the springs tend to vary the distance between the frame and the axle. The hubs are malleable castings with flanges, which hold the spokes of the wheel. Cup and cone ball bearings are used for mounting the hubs on the spindle. Bearing adjustment is by means of a nut on the spindle and spacing washers.

The Vulcan Front Axle

The Vulcan five-ton front axle, shown in Fig. 2, offers an example of heavy vehicle construction arranged for fore and aft steering, with the tie rod located to the rear of the axle. The axle center is a drop forging with integral spring seats. These spring seats are placed as

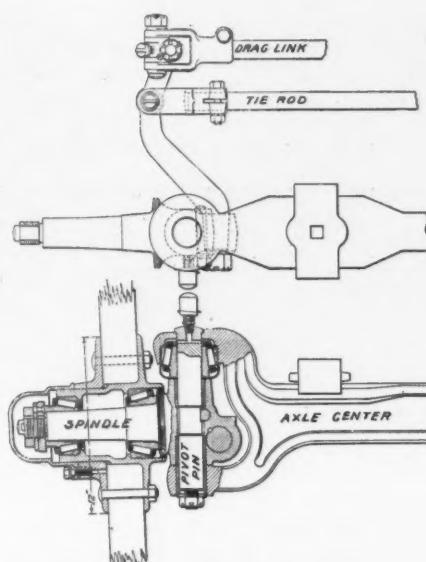


Fig. 4. The Timken Front Axle
Showing top and side views

close as possible to the wheel center in order to obtain the maximum capacity. The stress, due to both the combined weight of the vehicle and its load and that due to the wheel striking an obstruction,

spindle integral with the knuckle pivot and keying the arms to the former, these parts are forged separately and keyed together by integral keys. The pivot pin has a shoulder at one end and a nut at the other end to hold them together and the entire unit is supported by bushings and thrust washers in the fork of the axle center. The hub construction is of conventional design, employing annular ball bearings for wheel mounting.

The Peerless Axle

Fig. 3 depicts the Peerless front axle, which is built along conventional lines with drop forged center, integral spring seats and Elliot type knuckles. In detail, this construction differs from those mentioned above in that the bushings for supporting the pivot pin are located in the knuckle instead of in the axle fork. Thrust washers are replaced by a ball-thrust bearing, located in the upper part of the fork. The steering arm is forged integral with the knuckle arm and attached to the knuckle by a taper and key. The steering arm being so arranged as to clear the lower surface of the center. The front wheels are mounted upon Timken roller bearings and dished, that is, the wheel spokes are set at angles with

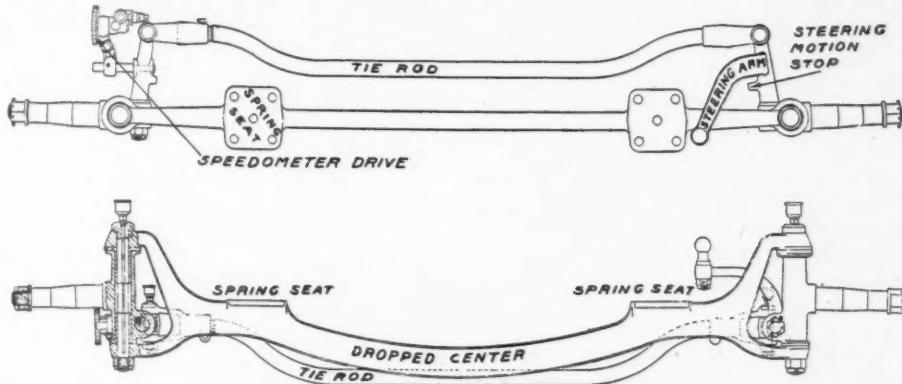


Fig. 5. Natco Axle—Top and Side Views
Arranged for left-side fore and aft steering with the tie rod located at the rear of the axle

increases from nothing at the center of the wheel to a maximum at the center of the spring seat. For this reason a minimum distance is desired. It is customary to increase the section of the axle center between the knuckles and spring seat centers, both in a vertical and horizontal plane to withstand this stress. The knuckles on this axle are also of the Elliot type, but instead of forging the

a plane perpendicular to the axis of the wheel.

The Timken front axle (Fig. 4) is used on a number of commercial cars. It has a drop forged center of I-beam section, and Elliot knuckles. The axles are arranged for either type of steering to meet the requirements of vehicle makers. However in this case the cross steering arrangement with the tie rod and drag link located in front of the axle is shown. The knuckle and pivot pin are locked together with a bolt, so that this part is properly supported by the Timken bearing in the axle fork. Timken bearings are also used for wheel mounting.

The axles mentioned above are all arranged for right side steering, while the Natco axle (Fig. 5) arranged for left side fore and aft steering with the tie rod located at the rear of the axle. It is of conventional design with Elliot knuckles and pivot pin bushings located in the knuckles. This illustration shows how the center is dropped to provide the proper clearance between it and the radiator or other units which may be near it. It also shows the method of providing clearance for the tie rod and it will be noted that

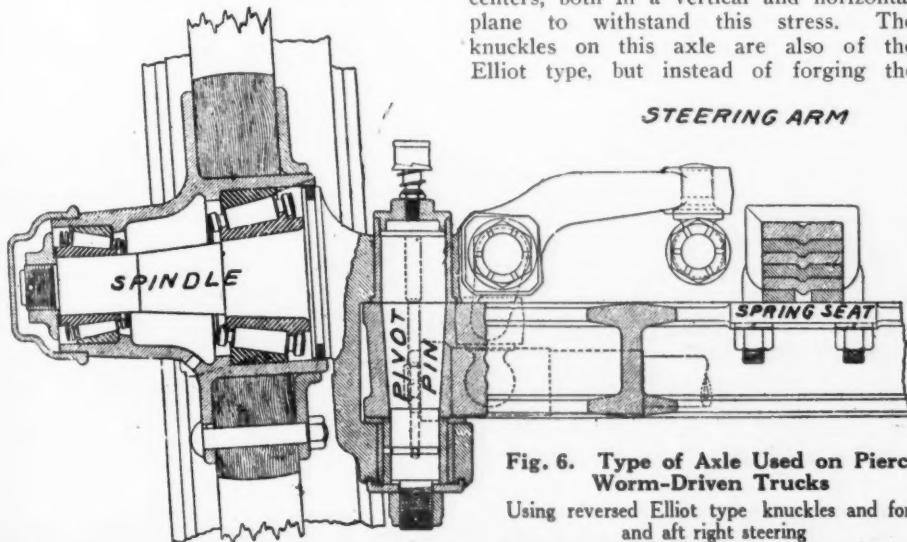


Fig. 6. Type of Axle Used on Pierce Worm-Driven Trucks
Using reversed Elliot type knuckles and fore and aft right steering

this is not bent to the shape of the axle, as provision must be made to compensate for the movement of the knuckle arms. This axle is an example of light truck construction, and also presents one method of driving the speedometer by gearing from the wheel.

Pierce Axle

The Pierce worm-driven trucks are equipped with front axles having reversed Elliot type knuckles and fore and aft right hand steering. The axle center is an I-beam section forging and is perfectly straight, with integral spring seats. The pivot pin bushings are located in the knuckles and so arranged that the thrust is taken by the shoulders of these bushings and a thrust washer. The pivot pin has a taper which fits into the axle center so that it can be drawn up tight by a castellated nut. The wheels are mounted on Timken roller bearings as shown in Fig. 6.

Packard Axles

The new Packard worm-driven trucks are also equipped with front axles (Fig. 7), employing the reversed Elliot type of knuckle; however, they are arranged for left side fore and aft steering. The axle proper, however, is dropped at the center. This construction is similar to the one depicted above, with the exception of the steering arms, which are attached to the lower part of the knuckle. This permits proper clearance for the tie rod and places it in such position that it is not necessary to bend it. A feature worthy of attention on both of these axles is the provision of ball and socket connections for the tie rod and drag link in place of the more customary clevis and bolt. These ball and

steel shells which carry the wheel bearings. The outer wheel bearing is of the roller type made by the I. H. C., while the inner bearing consists of a steel and bronze shell, the latter having a taper bearing in the shell inserted in the wood hub. The bronze

the axle bed. It is not necessary to bend it, since ample clearance is obtained by placing the spring seats above the wheel center. The wheels are mounted on Timken roller bearings and retained by a castellated nut and keyed washer.

Vim and Commerce Axles

The Vim and Commerce trucks also employ built-up axles with Elliot knuckles, but the center or bed is made of tubular section. The Avery farm trucks employ another type of built-up front axles. A malleable casting forms the steering head to receive the Lemoine type of knuckle, which is quipped with a series of hardened steel washers to take the thrust.

On either side of the steering head extensions are riveted a couple of steel plates as shown in Fig. 10. These are straight at the spring seats and bent up slightly at the ends to attach to the steering head castings. Blocks are placed between the two axle plates directly under each spring to form the seat. The steering connections are arranged for cross steering and are located in front of the axle.

The three-wheel "Wayne Light" commercial car having a capacity of 800 lbs. also employs a built-up front axle as

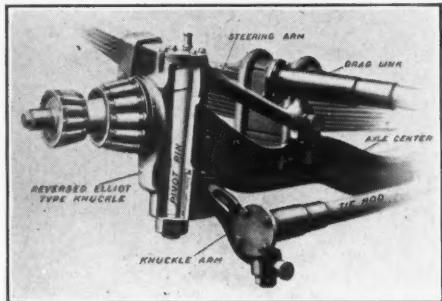


Fig. 7. Packard Worm-Drive Truck Axle
Reversed Elliot type knuckle; left-side fore and aft steering

shell is provided with oil holes and grooves, so that the entire bearing can work in graphite and grease. The knuckle, instead of having the usual hub for the pivot pin or king bolt, as it is sometimes

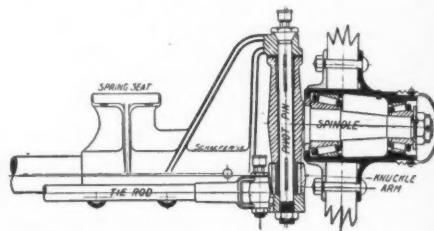
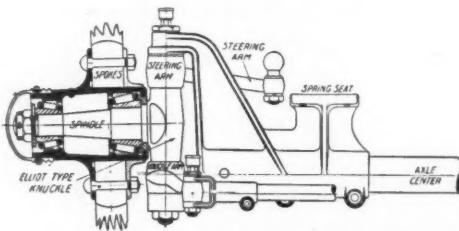


Fig. 9. Reo Two-Ton Front Axle
A built-up type of axle—a bar of round section, pinned and brazed into cast-steel ends which form the forks

called, has a yoke, which fits into the axle yoke. Short pins pass through the axle and knuckle yokes to form the pivot.

The above axles all have drop forged centers, which may either be forged in one piece or the two ends may be forged separately and welded together at the center.

The Reo Axle

The Reo two-ton front axle (Fig. 9) differs from those shown above in that the center is built up from a bar of round section, pinned and brazed into cast steel ends which form the forks. The knuckles are of the Elliot type and carry the bushings for the pivot pin. The knuckle arms fit over the ends of the knuckle and are held in unison with knuckle by two keys. This axle is arranged for left side steering and the tie is placed directly back of

shown in Fig. 11. Two sections of rolled channel steel are riveted together and with drop forged yokes and Elliot type knuckles at either end.

Pressed steel centers may also be used, while combinations of the above types may also be worked out.

Bearings

All American trucks are equipped with anti-friction bearings such as the ball and

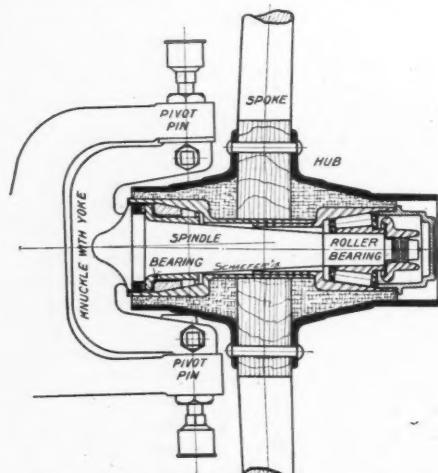


Fig. 8. Axle Used in International Trucks
In this construction the pivot center lies very close to the center of the wheel

socket joints have springs so that the wear in the steering connections is automatically taken up.

The International Harvester Corporation trucks for some years have used the Sarven type of wheel in connection with an Elliot type of steering knuckle, in which the pivot center lies very close to the center of the wheel. This is shown in Fig. 8, and it will be noted that the hub construction resembles an ordinary vehicle wheel hub. This consists of wooden hubs with steel hub flanges, the former have

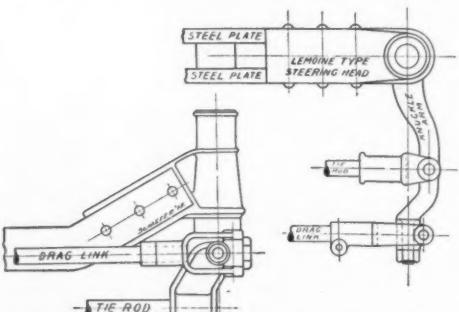


Fig. 10. Lemoine Type of Knuckle

roller types, which are capable of carrying both a radial and thrust load. The mounting of these bearings presents no difficulty and they are usually provided with adjustment to compensate for wear. The tie rods and drag links are made of tubular section and are provided with adjustment so that the alignment of the wheels may be properly maintained. Lately there seems to be a tendency to use the ball and socket joint for these in preference to the clevis. The former will to a considerable extent take up the wear automatically and can also be more efficiently lubricated.

Co-operative Management Makes Dump Trucks Pay

Details of Management and Service of Los Angeles Mutual Organization of Dump Truck Owners, Who Have Brought Order, Profit and Progress Into the Hauling Business

By FRANK REED



SHOPPING around among individual owners of dump trucks to hire their services for a day or week or whatever period they may be required, does not appeal to the big contractor. When he needs trucks he needs them in a hurry, and he wants to call up one man and say he wants one truck or twenty trucks, and be sure that they will be on the job. While they are at work he cannot afford to issue material tickets to twenty individuals, and take up details of operation one at a time with people he doesn't know. He needs the service of his organization to run his own end of the work. Some of the Los Angeles dump-truck owners met the contractor half way on this proposition by organizing the Dump Truck Association. It has ten members, each of whom owns and drives his truck. The members employ and pay a manager who has a desk and telephones in a conveniently located office. Contractors in need of trucks telephone to Mr. Earl Smith, the manager of the association, who makes a price, and the job is listed. If it requires more trucks than members of the association own, Mr. Smith calls in some truck owners who are not members of the association, but are glad to take its overflow work.

Choice of Jobs

Fairness in the distribution of jobs among members is assured by giving each one, in rotation, his choice of the jobs offered for a week. If on Monday morning the man having the choice finds there is a week's job of bad hauling or a day's job under good conditions, he may take his choice. Perhaps he will take the one-day job, and on Tuesday morning come in again and take his first choice of the work offered on that day's list. Even in the dullest times there is usually work enough offered the association for all its members, the membership being purposely not too large in order that this condition may prevail, as well as to insure that no inexperienced or irresponsible operator may be included.

Estimating Costs

Members of the association have experience sufficient to enable them to estimate closely the effects upon costs of the conditions surrounding any job. Mr. Smith, who was an experienced estimator before he took this place, gets the benefit of their combined experience. It is his duty to keep all the trucks supplied with good work, and he says that while he is inclined to see the rosy side of every job, what the other fellows see is the work and the cost, and if he lands a truck owner an expensive job, he very soon hears all about it. This daily check-up of bids and actual costs has given him a mighty well-rounded

experience and knowledge of operating conditions and their effect on costs, and everything he says is very much to the point and full of real meat for any man, no matter what his relation to the industry, who wants to really understand dump-truck conditions.

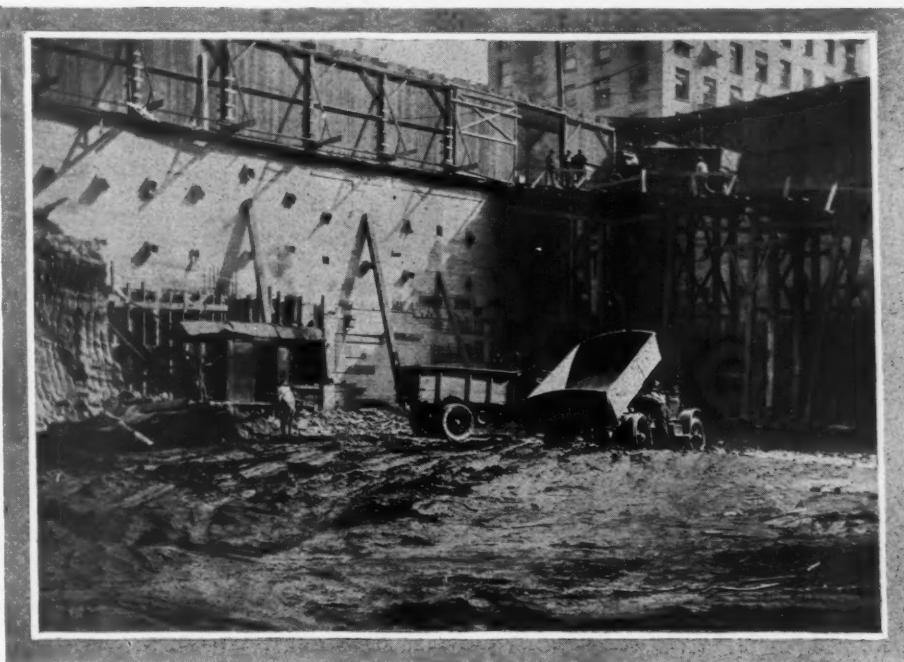
Load Unit Basic Rates Figured to Yield \$25 a Day

The basic figures they use in bidding on work are 15 cents a yard-mile, or 12 cents a ton-mile; or, by the hour, \$2.50 for a five-ton, \$2.25 for a four-ton, \$2 for a three-ton truck, for a working-day of 10 hours. They figure that these rates work out, under local conditions prevailing, to give a fair compensation for the use of the truck. They have learned that a truck owner, to take care of the idle time occurring when truck is necessarily laid up for repairs, or through lack of jobs, depreciation, insurance and all other real elements of cost, should earn \$25 per day for a five-ton, \$20 a day for a four-ton and \$15 for a three-ton dump. They find the aver-

Relations with the people who hire trucks seem to be on a basis of a general understanding of conditions on both sides. The truck operators have not worked things out so they are protected against a fall-down on the part of the contractor after a bid is made. If the contractor's machinery or organization breaks down for an hour or a day, or some little matter occurs such as a delay by city inspector, or being out of boards for unloading, the dump-truck owner loses.

Individuals Buy and Pay for Trucks Out of Earnings

Dealers in dump trucks seem to have concluded, on the basis of their experience, that in spite of its difficulties and troubles, the successful method of marketing them is to sell them on time payments to individuals. In view of the centralized control, to a certain extent, of the service, selling and operating features, which have grown up among the individuals of this association, it is a fair question to consider whether there is a tendency toward a con-



Steam Shovel and Dump Trucks Make Quick Work of Excavating Job
Trucks climb 27% incline built around two sides of the excavation. Mexican behind truck carries block for blocking wheels in case of need; a "safety first" measure which was never required

age cost of operating a five-ton truck is \$18 per day, including \$4 wages for the driver. In getting at their costs they figure a truck depreciation of 100 per cent. in five years. Tire depreciation they figure on a 7000-mile guarantee and this gives a cost for tires alone of \$5 a day, figuring on \$500 for a round of tires, average haul of 70 miles a day, requiring one new tire every 100 days.

dition where a large company owning dump trucks and hiring drivers, would not be in a better position to handle the hauling needs of a city. Mr. Smith discusses this in an entirely dispassionate, business-like way, but makes the very positive statement that there is only one kind of man who can afford to be in the dump-truck business—the man who owns his truck and drives it himself. Here, one of the truck

owners in the association supplemented this statement with the remark, "If his ideas aren't too big." If a man will be content with this kind of work at fair wages; if he runs his business right in a co-operative way, such as this association affords the means of doing, he can make his payments and buy his truck out of earnings, and provide for its replacement when worn out. Practically all the members of this association bought their trucks out of earnings. Of course, they are rated as being among the most successful truck operators in the city. Some of the less successful operators have gotten into difficulties and, in not a few cases, lost their trucks through not figuring properly on depreciation and repairs and idle time. A mechanic earning \$4 a day, who has \$500 saved, and sees an opportunity to get a good hauling job, may be attracted by the life of outdoor independence and take over a truck with his \$500 as his first payment, agreeing to pay from \$200 to \$300 per month. If he starts in the spring with a new truck, he is likely to work all summer without any trouble, and thinks he is making big money. If he gets \$25 a day for his first job, he is soon piling up a surplus so fast that, if there is close bidding on the next job, he will shave down to \$20 a day, and once they start this process they do not seem to know where to stop, and get down even as low as \$15 or \$16 a day. Even at these rates they seem to be making good money until they get to a point where they tear off a few tires, and shortly after that may have to have her overhauled at an expense of \$400 or \$500. It is an even chance that they will have not provided a sinking fund to take care of these repairs, and at this point they begin to fall down on their payments, and from that time on are struggling in rough water with chances against their pulling through. One of the leading dealers says that in the dump-truck situation his most difficult task and most serious duty, is to go over the situation in advance with his prospects and make them realize what they have to earn in order to keep up their payments and make a living and take care of depreciation, so when the truck wears out, as it eventually will, they will be financially able to replace it. In other words, it is easy

enough to sell a dump truck. The dealer has to use his brains to get the money for it afterward. So he must study working conditions and costs, and guide prospects intelligently toward prosperity in serving his own interests.

Making Trucks Earn Their Purchase Price

The experience of the association indicates that it is a real man's job to make good with a dump truck, but that it is entirely possible is proved by the experiences of the members. It takes physical strength and mechanical brains and business judgment and character. Conditions which must be met include ability to resist the spending of what, temporarily, may seem like "easy money." One man in the association made \$600 a month for 8 months. It requires backbone not to spend this, but put it into the rainy-day fund.

Prices According to Loading and Unloading Conditions

The association charges non-members 5 per cent. on every job awarded them. It takes most of the work offered. In general, there are just two reasons for turning down a job; road conditions no good, or price offered no good. If loading and unloading conditions are bad, the effect on costs is estimated, and the price made accordingly. If road conditions are very bad, tire risk is so high that a safe price would be prohibitive. The only thing is to postpone the work and improve the road. The large contractors have constantly studied their loading and unloading conditions, and improved them so that machines can get the utmost working time. Between the average of the first-class conditions provided at these better plants, and the poorer conditions where these matters have not been studied and improved, there is a difference of one to two loads a day, making a difference of 15 to 20 per cent. in the cost of hauling. The dump-truck owners have had considerable difficulty in handling jobs where loading is to be done through chutes off a car. The difficulty is in controlling the situation so that a truck can get in full time. If the haul is short, it cannot afford to wait for 20 minutes while a load is being shoveled in. The job is left to the horses. Experience has shown

that there is a loss of nearly 50 per cent. in time on most of these jobs as compared to loading from bunkers, while the contractor wants the hauling done at the same price as if it were done out of bunkers. Cars may be ordered for a certain day and not arrive till the next day, or eight cars a day may be ordered and received steadily for two or three days, and then will come a day when only six will arrive, due to conditions arising out of railroad operation, or at the point where cars are loaded. Bunker loading, of course, is not subject to this hazard, because the bunker contains a reserve supply which can be relied upon to give steadiness of loads.

Growth of Dump-Truck Business

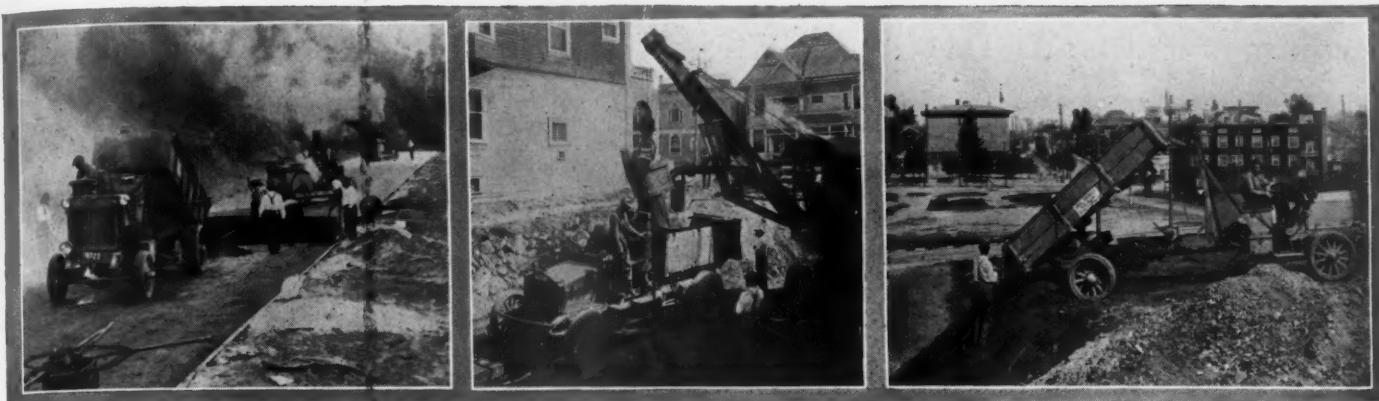
The returns to dump-truck owners have fallen off considerably as compared to two years ago. At that time the rates in Portland were \$5 an hour, and it was no uncommon thing for truck owners to work their trucks in two shifts and pull down \$100 a day. In Los Angeles the rate was \$3 an hour, and a man could make \$40 a day by working overtime and have it all to himself. The dump-truck business has grown fast, and in its 3 years of existence has got out of the speculative stage into a business man's proposition. While some of the big contractors own dump trucks, the tendency has been to leave their operation in the hands of the small owners who own and drive one truck. The contractor cannot regulate his use. One day he will want twenty, and the next day none. There is no way he can handle the proposition of maintaining an efficient staff of drivers under these conditions. Then, too, prices have got so low that some of the contractors have laid up the trucks they actually own, figuring that they can hire trucks cheaper than they can operate them. The independent ownership of trucks enables the contractor to get the service he needs without tying up a lot of money in equipment. One week the association had in operation for a big contractor trucks belonging to members and outsiders aggregating an investment of close to \$200,000. The importance of the truck on a job of this kind is shown by comparison of the



Asphalt and Gravel Efficiently Delivered With Dumping-Body Trucks

First illustration shows hot asphalt being dumped between street-car rails, by Fairchild Gilmore Trucks, which are shod with new type of Goodrich tires, so shaped as to receive minimum wear when run between tracks. They are specially designed for dump trucks. Next illustration shows gravel being dumped in front of residence, in the usual course of delivery. Efficient delivery is a big factor in building up the business against competition of Japanese who cut prices, but use horses, and have to haul an order in two or three loads, and make a low, wide-spread pile when they dump or shovel it out, which interferes with street traffic and the appearance of the high-class property. Third illustration shows special loading arrangement used by a large Los Angeles contractor.

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers



Various Jobs Performed by Dumping-Body Trucks

Special interest is centered in the first picture, which shows how little labor is required on work in progress over a considerable section. The trick is in balancing truck delivery capacity against working capacity of the rollers; and one of the factors in reducing amount of labor required for spreading the hot asphalt is the ability of the operator to perfectly control the dumping after a little practice.

value of the rolling stock with the contractor's investment in heavy machinery, which probably did not exceed \$40,000 even on this big job. It is quite a common experience for the truck owners to encounter a contractor, whose equipment averages considerably less investment than that in the rolling stock required to take care of the job, who will try to dictate terms to the truck men.

Three Miles Dead Line Between Horse and Truck

On a basis of cost alone, the association does not figure that it has put the horse entirely out of business. They like to see a few horses at work to take care of the stuff that they don't wish to handle, like unloading from railway cars on team tracks for a short haul, and where roads are bad. Mr. Smith puts the dead line as between horses and trucks at 3 miles. He figures it out this way: 24 miles a day is all a team of horses or mules can pull. This makes four round-trips on a 3-mile haul. The charge here is \$5 a day for a team (two mules and a dump truck) hauling 3 yds. at a load. The hauling capacity being 8 yds. per day on a 3-mile haul, cost per yard is 62½ cents. Working a five-ton truck on this 3-mile haul, loading from bunkers, it makes ten trips in the 10 hours, carrying 5 yds. to the trip at \$25 per day; this makes the price 50 cents per yard. This saves 12½ cents a yard for the contractor, takes care of all the operation and up-keep expenses of the truck, and pays the driver \$4 a day, while the mule-team driver gets only \$2.25. The greater the distance, the higher is the difference in favor of the truck. Take a 25-mile haul; here, due to the condition arising from pulling a full day under load, a team has to rest up and should only be worked two trips in 6 days. That is, in 6 days they would haul 4 yds. Cost at \$5 per day, \$30, equals \$7.50 a yard. A five-ton truck would make two trips a day, 5 yds. to the trip, 10 yds. in the day at \$25 equals \$2.50 a yard. On asphalt work the team gets no consideration above 3 miles, because the heat in the material will not endure slow hauling for a greater distance, and "it's the road work that keeps our trucks busy."

SINGLE SOLIDS BETTER THAN DUAL—GOODRICH

S. V. Norton, sales manager of the truck tire department of the B. F. Goodrich Company, Akron, Ohio, has made a few statements which are causing considerable discussion among manufacturers and users of truck tires. His statement is that the company recommends the use of 5- and 6-in. single solid tires in preference to 3- and 3½-in. duals, but where singles are larger than 7 in. it is more desirable to use 4-, 5- and 6-in. duals, as the conditions demand.

"Momentary, overloading of solid truck tires," says Mr. Norton, "which ruptures the rubber by displacing it beyond the limits of its ability to recuperate, is the cause for more tire failures than probably any other factor.

"Momentary overloading means excessive strain or shock on the tire at certain points, due to the tire being forced to bear in one way or another more load for an instant than it is intended to support. This may be due to road inequalities, or other conditions.

"In the smaller dual sizes, those made up of less than 4-in. units, neither tire is itself large enough to withstand these momentary loads, such as when one of the singles comprising the dual set takes the entire load and the other is not touching the ground. A modification of this condition happens on crowned roads where the curve of the surface places more load on the inner tire than the outer. The net result of this condition in which the load is alternately shifted from one to the other is a permanent rupture."

Many advantages are advanced for the use of 5- and 6-in. singles in preference to 3- and 3½-in. duals, some of which are as follows: 1—Saving in tire cost. 2—Saving in wheel cost, due to narrower felloe, narrower felloe band, and other changes in wheel design. 3—Saving in unsprung weight of wheel, tire, and metal equipment. 4—Saving in applying one tire to the wheel as applying two. 5—Larger tire units will better absorb uneven road surfaces, and better compensate for excessive road crown thereby keeping the whole tire always in use. 6—More readily fitted with non-skid chains. 7—Better trackage of rear wheels with front wheels. 8—

Greater height of rubber tread, and consequently more cushion and increased life in tires greater than 3 in. wide which are ¼ in. lower than regular sections of greater width. 9—Less leverage strain on the axle and bearings due to the decreased width of wheel tread.

Mr. Norton believes that the schedule of tire ratings now in use which rates duals higher than the equivalent singles is open to criticism and that this rating may be altered in the near future. He believes that dual tires cannot possibly have a greater carrying capacity than twice that of a single tire of which it is composed, and hence the error in the existing ratings.

AUTOCAR NEW YORK BRANCH USES MOTORCYCLE

The New York Branch of the Autocar Company, of Ardmore, Pa., uses a motorcycle for covering the outlying territories around New York City. An Autocar mechanic covers three routes with the motorcycle: Long Island with 36 Autocars to take care of, Connecticut with 34, and New Jersey with 29. Besides the regular work of inspection, the operator carries with him small parts and is able to make minor repairs right on the territory.

Return postcards are sent to the Autocar users along the different routes so that definite arrangements can be made to catch the Autocars at the most convenient times. The



Motorcycle for Autocar Service

inspector is often out for a week at a time; however, he keeps in frequent telephone communication with the New York office and is always in touch with developments in the territory he is covering.



THE WALTER POSITIVE DRIVE DIFFERENTIAL

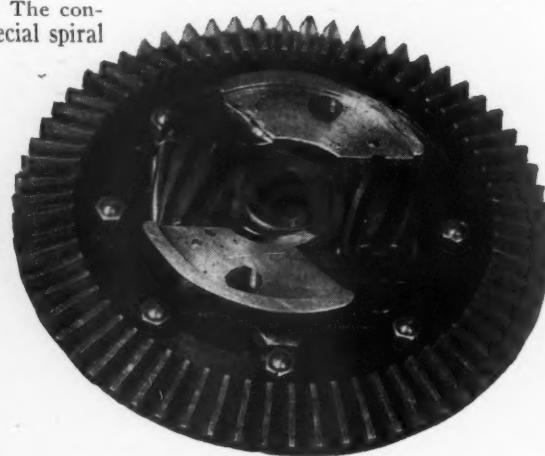
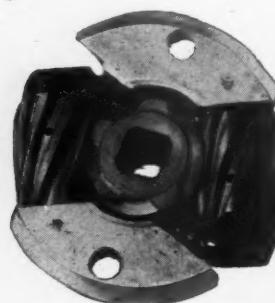
The Walter Positive Drive Differential is an irreversible worm gear differential which drives both wheels regardless of the traction conditions of the other wheel and which still has a compensating differential action.

The differential is very simple, consisting of two pairs of spiral gears mounted in a



Exterior of Walter Differential

two-part housing, and meshing together and separately with worms mounted in the housing and on the drive shafts. Both halves of the housing are alike except for the bevel gear flange. The two bolts which bolt the housing together set one-half ahead of the other so that the spiral gear pairs mesh directly together. The worms have a $2\frac{1}{2}$ degree lead angle as this has been found to be the best in practice. The construction is not limited to any special spiral angle.



Walter Differential Disassembled

Showing the worm gears, which engage the wheel driving shafts, and the spiral gears which give a compensating action in turning, but also drive both wheels regardless of traction. Made by E. & M. Walter, 145 West Ninety-second Street, New York city.

The CCJ leads in circulation, advertising and prestige

The operation is as follows: The driving resistances of the wheels tend to rotate the spiral gears on their pins, but in opposite directions, but if one wheel has a greater resistance the inequality of force cannot drive the other wheel faster as the spiral gear cannot drive the worm, so both wheels are positively driven. When turning, the outside wheel rolls faster and so permits the inside wheel to turn correspondingly slower, giving a compensating differential action.

It is said that the flexibility of the worm gearing is very effective in diminishing the shocks transmitted through the differential, and provides a smooth and quiet differential action.

The advantages claimed for this differential are that the car will not stall if a single wheel alone has traction; the motor power is used more effectively as both wheels are steadily driven; skidding in many cases is eliminated, due to the steady driving of both wheels; the wear and strain on tires due to an accelerated wheel recovering the road is eliminated.

MAGNALITE PISTONS

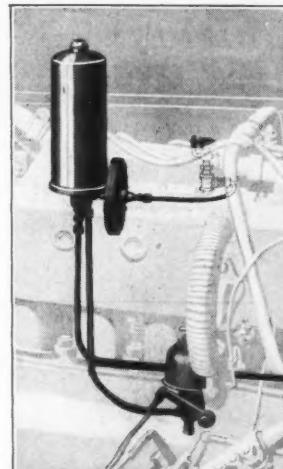
The Walker M. Levett Company, 10th Avenue, corner 36th Street, New York City, is manufacturing an aluminum alloy piston under the trade name of "Magnalite." The makers claim that these pistons have a thermal conductivity of 14 to 1 as compared with iron, resulting in a cooler engine. These pistons weigh about one-third as much as cast iron ones. The use of these pistons also prevents the possible danger of scored cylinders inasmuch as seizure of the piston is entirely eliminated by the fact that in the event of negligence or improper lubrication the softer metal will go, leaving the comparatively more

expensive cylinder walls uninjured. This company is prepared to supply Magnalite pistons in quantities to the trade or individual.

THE CARTER AUTOMATIC GRAVITY TANK

The Carter Tank is said to be the most simple device of its kind on the market. It has only three moving parts, consisting of a container with a capacity of about one quart, connected with the main gasoline tank. With each downward stroke of the piston a diaphragm pump lifts fuel from the main tank to the Carter Tank, from which it flows to the carburetor intake by gravity.

The capacity of the Carter system is unlimited. Its action is progressive, increasing the fuel supply in proportion to the in-



The Carter Automatic Gravity Tank Installed

creased speed of the engine. The delivery of fuel is increased from 6 gallons per hour at 300 revolutions per minute to 22 gallons per hour at 1500 revolutions per minute—more at all times than any engine will need. In tanks actuated by suction of the intake manifold the suction is less than one-quarter as great at high speed as at low and the demand for gasoline is accordingly decreased in proportion as the demand for fuel by the engine increases.

The Carter Tank is bracketed to the engine as high as the hood will allow and is filled automatically from the main gasoline tank, which can be located in any position desired. This arrangement does away with the necessity of placing the tank in the cowl.

The Carter Automatic Gravity Tank may be readily attached to any car, old or new. It is marketed by the H. W. Johns-Manville Company, Madison Avenue and Forty-first Street, New York City.

MASTER SPARK PLUGS AND GARAGE PUMPS

The Hartford Machine Screw Company, 480 Capitol Avenue, Hartford, Conn., calls attention to its latest products which are illustrated herewith. The master spark plug is made in all sizes, the feature of the line being the Ford Special Plug. In addition to this line there is the regular length Master and the extra long Master plug for engines with extra thick water jackets. Prices are \$1 for the regular length and \$1.25 for the extra long and Ford Special.



Master Model W Garage Pump

A strong two-cylinder pump driven by a $\frac{1}{2}$ h. p. motor; furnished in portable and stationary types.

The Master Garage Pump is built in two models, the model W having a two-cylinder pump, which may be furnished either on a truck or stationary, and is designed for use in the larger public garages, where continuous demands are made for tire inflation and quick service must be delivered. It may be used either as a direct pump for supplying air directly into the tires or in connection with a compressed air tank installation in order to maintain a supply of air "on tap."

A practical feature of the Master Pumps is that in every model of pump no piston rings are used. The pistons are extra long, of special steel carefully hardened, tempered and ground and lapped into the cylinder walls. By eliminating the piston rings and by using extra long pistons, all chance of any oil getting through into the inner tubes is eliminated, and as an added precaution, however, a small expansion chamber is attached to each pump which serves to clarify the air and is a positive guarantee against impurities entering the inner tubes.

Model Y is a stationary belt-driven pump, built for garages which are equipped with a



Master Model Y Garage Pump

This is a stationary belt-driven model, having the same characteristics as Model W. It can be used direct or to a supply tank.

power unit and shafting. It eliminates the necessity of an extra motor and is a powerful pump, embodying the same characteristics and quality as noted in Model W. It will deliver pure air in a steady stream direct or may be used to fill a compressed air tank.

In addition to the two above mentioned models, Model P, stationary or mounted on a truck, is continued from last year. It is electrically driven and is particularly efficient in private garages or small public garages serving from fifteen to twenty cars.

The electric-driven models are equipped with electric wire connections, as well as reinforced air hose, pressure gage and a special nozzle which fits onto the end of the air hose—very useful for blowing dirt and dust out of inaccessible corners of car and machinery. The Hartford Machine Screw Company fully guarantees its pumps for one year.

MERCURY ARC RECTIFIER IN CHARGING SMALL BATTERIES

To meet the demand for a mercury arc rectifier with which the owner of a few motor trucks can conveniently charge his ignition or lighting batteries at home or in his own garage, the General Electric Company, of Schenectady, N. Y., is manufacturing a small inexpensive outfit which can also be used for operating electric bells, electro-plating and other uses where not over five-ampere, fifteen-volts direct cur-



G. E. Rectifier

Above is shown the G. E. Rectifier with the cover removed

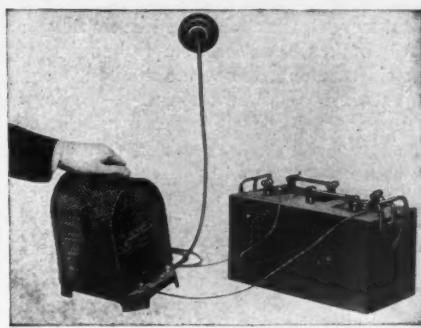
rent is required and only alternating current is available.

The new rectifier consists of a metal base, on which are mounted the necessary reactance coils and the rectifier tube in a suitable cover, the whole being encased in perforated sheet metal. It is designed for charging one three-cell, one six-cell or two three-cell batteries as required, and is automatic in that it is self-adjusting to any of these three conditions. In fact, the rectifier may be connected to a single-cell battery and will charge it at the rate of approximately 6 amperes from 110-volt, a.c. supply.

This type of rectifier can be furnished for 60, 50, 40, 30 or 25 cycles, 110-volt circuits. It is exceedingly compact, the outside dimensions being roughly: width, $6\frac{1}{2}$ in.; depth, $9\frac{1}{2}$ in.; and height, 11 in. The total weight of the sixty-cycle rectifier is approximately 15 lbs.; therefore, it may be

transported from place to place in a garage, rendering unnecessary the removal of the battery from the car.

The cost of charging either a twelve-volt (six-cell) or two six-volt (two three-cell)



G. E. Rectifier

This cut shows the method of starting the G. E. Rectifier

batteries for a ten-hour charge is about \$13; or the same for a single six-volt battery. This cost is based on a rate of \$.10 per kilowatt-hour for current.

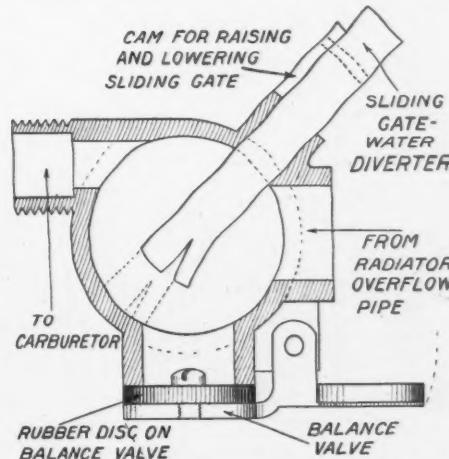
SE-MENT-OL—A RADIATOR CEMENT

Under this trade name the Northwestern Chemical Company, Marietta, Ohio, is manufacturing a self-acting radiator cement, which is applied by simply pouring it into the radiator. It dissolves in the water and circulates through the cooling system. It flows out through the leak. The moment the Se-ment-ol strikes the air it congeals into a hard cement that is claimed to plug the leak permanently.

After the cement has "set," the radiator is drained dry and refilled with fresh water, leaving the entire cooling system free from any foreign substance. Price per can, \$.75.

THE DEITZ CARBON ABSORBER

Henry Deitz, 416 W. Fourth Avenue, Denver, Colo., is marketing a device which draws water vapor from the top of the radiator and delivers it into the carburetor. The result is said to be a better explosion,



Deitz Carbon Absorber, \$5

prevention of carbon accumulation, added power, fuel economy and a tendency to keep the cylinder cool. An automatic valve prevents water from being drawn through. The device is made of brass and sells at \$5.

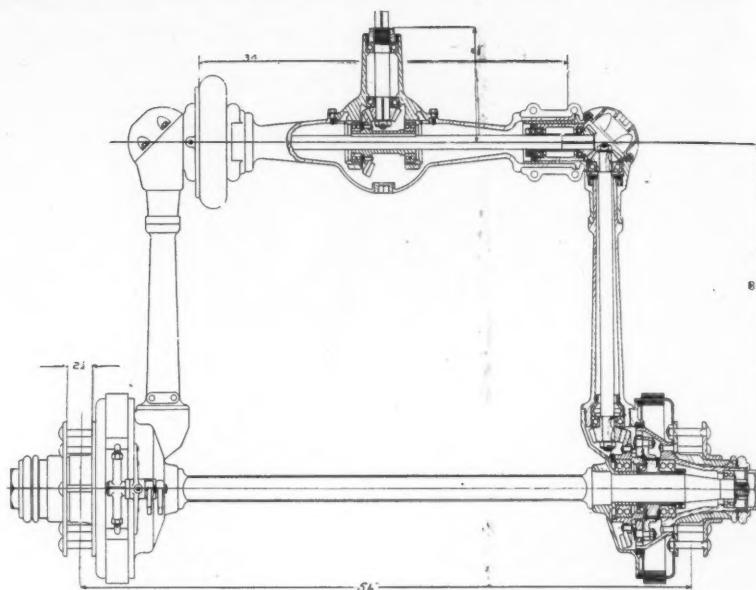
A NEW TRUCK AXLE WITH ADLER DIFFERENTIAL

Moore & Lorenz Company, 2144-52 Fulton Street, Chicago, Ill., have just brought out an entirely new rear axle construction which it is claimed will save the truck manufacturer considerable in assembling and also makes possible interchanging the wheels of the truck without disturbing the adjustment of the bearings. Another advantage is the self-oiling feature. By filling the upper end with grease it will lubricate thoroughly all moving parts clear to the hub-cup without any leakage.

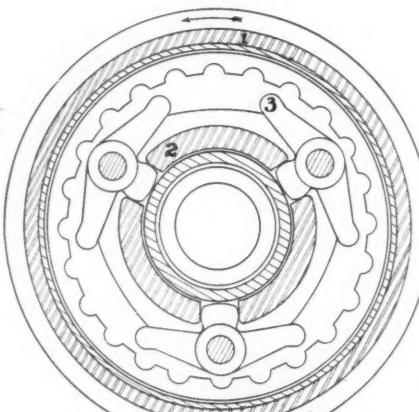
This axle has a direct shaft drive and just a plain solid axle with the differential placed inside of the brake drum in each wheel, which construction is said to materially lighten the rear part of the car.

The illustrations show two styles of this axle, one of the outfits being designed for heavy work and is fitted with a jackshaft, while the other is made in a triangular shape, joined at the apex with a ball socket. It has a ball socket connected direct to the transmission, which does away with extra brackets and mounting, and which allows the unit to be assembled without further change in the construction, simply by fastening the springs to the respective spring brackets. The advantages claimed for this construction are that it has a positive pull on the two wheels, regardless of their traction, and that it is impossible for one rear wheel to skid or spin in a mud or sand hole when the other has traction.

The Adler differential which is incorporated in each brake drum consists simply of an arrangement of locking cams which engage a series of semi-circular notches. In the illustrations (1) and (2) are integral. Moving part (1), which is one-half of the differential housing in the direction of the arrow, naturally moves part (2) in the same direction and forces the locking cam (3) in contact with notches, producing a positive pull forward. In reversing, the opposite end of cam engages notches. In going around a curve the inside wheel will stay in the same position and speed as before turning, while the outside wheel runs faster and in doing so it disconnects



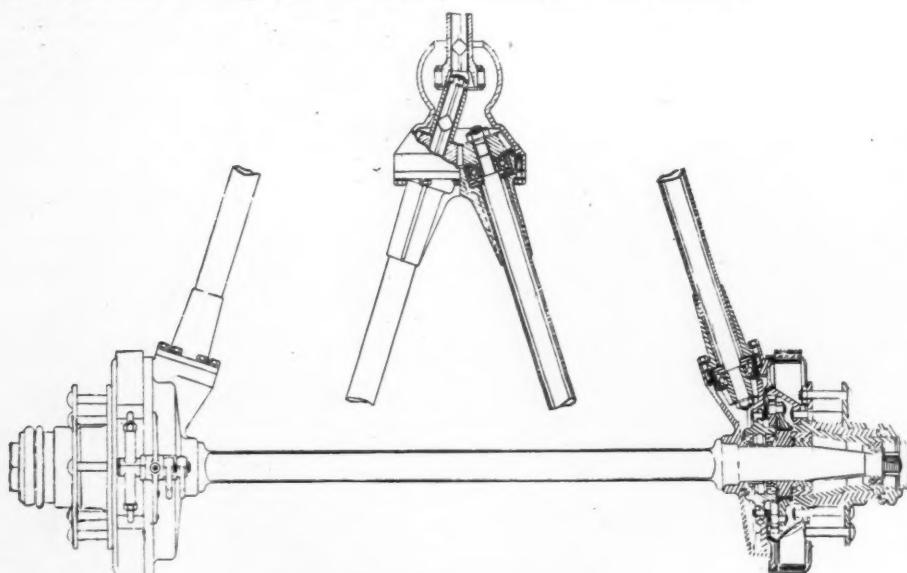
Jack Shaft Outfit With Adler Differential
Suitable for 1½ to 2½ ton trucks of 30-40 h. p.



The Adler Differential
Side view of Adler differential mounted in each
brake drum: For explanation see text

itself, in other words, it gets into neutral position, so it can spin freely until it comes into straight drive.

This company is also producing a light construction for Ford cars.



Rear Axle Outfit With Adler Differential
Suitable for 1½ to 2½ ton trucks of 30-40 h. p.

NEW ELECTRIC SEARCHLIGHT

The Pittsburgh Motor Truck Searchlight, illustrated herewith, is of interest for the reason that its low current consumption (1 ampere) makes the ordinary dry cell battery an economical and satisfactory source of current supply. It employs a powerful focusing lens in connection with an 8 in. parabolic reflector.



The Pittsburgh Motor Truck Searchlight

The lamp is provided with a bracket for mounting on the dashboard, floor, or seat at the driver's side. The bracket is so constructed that it can be turned in any direction and at any angle, while turning and backing the truck and for spotting house numbers and street signs. When detached from the bracket, it serves as a trouble lamp, and when used with dry cell batteries constitutes an independent auxiliary headlight system for use in case of failure of the regular headlights.

The bulb is a 6-volt Mazda, which permits the lamp to be used with any 6-volt lighting system, as well as with dry cell batteries. It is manufactured by the Pittsburgh Electric Specialties Company of Pittsburgh, Pa.

THE AUTOPROTECTOR

Here is a new device which the makers claim fills the needs of the truck manufacturer and owner. The Autoprotector, or automatic control for motor trucks, is designed to prevent abuse to a car, to encourage careful driving, and to record the number of times the car has been carelessly driven. It puts a check on the reckless driver and can be adjusted so as to temporarily reduce the speed of the vehicle if there is any careless use of the transmission brake or throttle.

The mechanism of the Autoprotector consists of an inertia weight so mounted in a

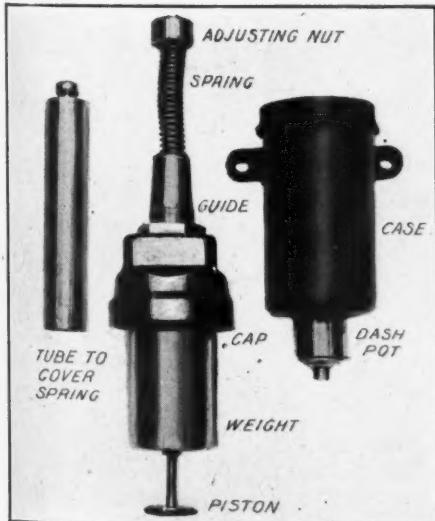


Exterior View of the Autoprotector

metal case as to be moved or projected from a normal inoperative position by its own inertia when the motor vehicle is subjected to an excessive shock or vibration that cannot be absorbed by the springs and tires, a counter forming a part of the mechanism to record the number of destructive shocks that are received by the motor car.

The movement of the sensitive or inertia weight is controlled by an adjustable spring, the weight being held in a normal or an inoperative position when the shocks or vibrations are unimportant.

The mechanism of the Autoprotector becomes operative, however, when the vibrations or shocks increase in amplitude and strength that they are liable to be destructive to the tires and mechanism of the motor vehicle. Any degree of sensitiveness of the action of the weight can be made,



Parts of the Autoprotector

This illustration does not show the counter mechanism. The Autoprotector is furnished with or without the counter as desired.

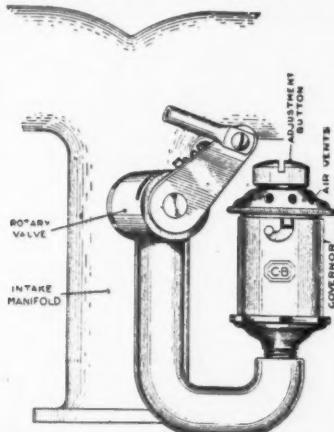
THE COMMERCIAL CAR JOURNAL

the spring being adjusted to the roughness of the road. A road in poor condition presents a series of depressions and obstacles likely to cause shocks and vibrations. The Autoprotector constantly requires an operator driving over a road of this character to be alert and careful, and it is an incentive to prevent recklessness as it will be recorded by the counter.

This device is manufactured by the Autoprotector Company, Dorchester, Mass.

THE C. B. INTAKE GOVERNOR AND PRIMER

This device is attached to the intake manifold just above the carburetor. An adjusting button at the top regulates the amount of air permitted to enter the mixture. The advantages claimed are a better mixture, less carbon, smoother running, increased speed, power and economy. By in-



C. B. Intake Governor and Primer, Attached

jecting a decomposing liquid the device can also be used as a carbon remover. The device lists at \$3; with dash or steering post control, \$4, and with hot air attachments, complete, at \$5. It is made by William J. Bailey, 401 Mulberry Street, Newark, N. J.

THE MORGAN PISTON RING COMPRESSOR

A tool, to save much time and trouble in entering a piston into a cylinder, is made by the Morgan Manufacturing Company, Newport, R. I. For pistons from 2 to 4 in. in diameter, the price is \$.50 each; from 3 to 5 in., \$.75, and from 4 to 6 in., \$1. Two are necessary for full equipment.

The tool is constructed of vertical straps made of steel and joined together by a flexible steel cable. Lugs on the end vertical pieces permit a clamp to draw the piston rings into their places, when the tool is



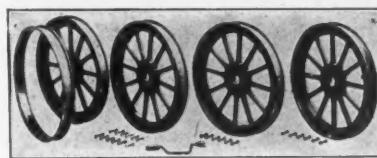
Morgan Piston Ring Compressor

Vertical steel pieces held together by flexible steel cable. When clamped around a piston, it holds the rings in place.

placed over a piston. The cylinder is then passed down over the piston, the contractor entering the rings without waste of time or trouble.

SUPERIOR WOOD WHEELS FOR FORD CARS

The Superior Lamp Manufacturing Company, of 136 West 52d Street, New York City, has brought out a set of demountable clincher wood wheels for Ford cars. The set consists of four best-growth hickory



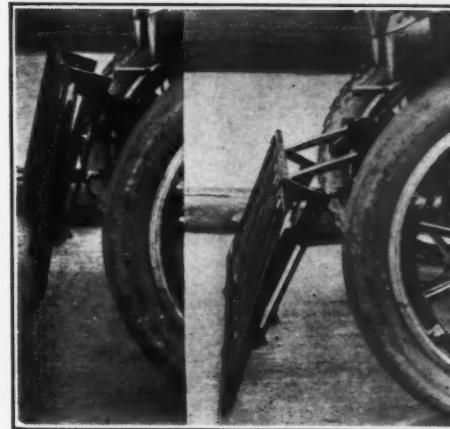
Superior Wood Wheels

wheels with demountable rims attached, including one spare rim, with wrench, bolts, and holes drilled, ready to attach. The outfit is furnished in either natural wood or black finish at the same price.

The set lists at \$16, with a discount to the trade.

"GASO-TONIC"

Under this trade name the White Manufacturing Company of Cincinnati, Ohio, is marketing a gasoline energizer which is said to increase the engine power and mileage anywhere from 25 to 40 per cent. and also reduce carbon formation. About one ounce of the liquid is added to 5 gallons of gasoline.



The Hero Safety Fender

This fender is made by the Hero Manufacturing Company, Finance Building, Philadelphia, and is noticeable in that it is not automatic. It depends entirely upon the actions of the driver, which actions of throwing on the brakes and dropping the fender are coincident, and follow the impulse natural in an emergency. The fender is direct-connected with a braking foot located on the pedal or floorboard of the car.

Wichita Transportation Company, recently organized in San Diego, Cal., is now using five motor trucks in carrying goods between that city and the Imperial Valley, and it is thought that the number will shortly be increased to fifteen. John A. deBarre is general manager and will conduct the business from the central office at 1067 Front Street, San Diego.

Motor Trucks Effect a Big Saving in the Construction of Twin Peaks' Tunnel in San Francisco

By A. A. WILLOUGHBY

THE digging of Twin Peaks' tunnel by the City of San Francisco to provide rapid transit street car service to and from suburban points, involves the removal of nearly half a million cubic yards of material. The tunnel when completed will be 12,000 ft. long and cost \$4,000,000. On the western end, for a distance of 7000 ft., the material from the bore will be dumped into a nearby canyon. On the eastern end and in for a distance of 5000 ft. it has been necessary to provide for the removal of the material to a distant point, the eastern portal being in a thickly settled portion of the city. The R. C. Storrie Company, tunnel contractors, awarded the contract for hauling to the Western Motor Drayage Company, of San Francisco, on the basis of a fixed price per cubic yard.

The drayage company owns and operates eight five-ton Packard trucks, but has twenty more under lease, including Whites, Popes, Federals and several other makes.

The hauling contract calls for the removal of approximately 200,000 cu. yds. of material, of which 63,000 cu. yds. will be back fill in an open cut 2000 ft. long, the first section of the tunnel. The draying company also secured the contract for hauling to the scene of operations gravel, sand and cement in the following amounts: 120,000 cu. yds. of gravel and sand and 100,000 barrels of cement. As many as thirty to thirty-five trucks have been employed at one time in the different branches of the work. The average yardage removed per day of 16 working hours, two shifts, has been 1000 cu. yds. pit measurement, but as high as 1600 yds. have been handled between the tunnel and the dump, 3½ miles distant. Wet weather interfered seriously during March and April, but continuous service was given at all times.

The following figures furnished by Mr. H. H. Whiting of the company cover complete costs of operation on Truck 21, one of the company's fleet, for a period of thirty days under normal conditions. This truck had been in service for several months previous to the time of checking the cost data. The following are the items of expense:

Drivers' salaries	\$194.73
Repair parts	18.79
Gasoline (786 gals.)	82.62
Engine oil (31 1/2 gals.)	11.70
Other oils and greases	3.30
Repair shop labor	45.00
Tires (2335 miles at \$.07)	163.45
Licenses	2.50
Taxes	2.00
Fire and liability insurance	7.40

Total cost of operation \$581.47

Several items need some explanation. The licenses required to operate a motor truck are \$20 per year state and \$10 per year city, or a monthly charge of \$2.50. In many states and cities employers' liability and workmen's compensation insurance is in effect, based on the amount of the payroll. The San Francisco rate is \$2.20 per \$100 of payroll. This item is not entered

in the list, as it is not a universal charge. The administration expense is not given, as it varies with each company and would not be a valid fixed amount. Depreciation is not entered in the expenses of operation. At the end of the year it is customary to charge off 20 per cent. to depreciation, figuring the life of the truck to be five years in this service.

Out of a possible fifty-two shifts in the 30 days period, 6 days a week, the truck was in service fifty shifts and transported approximately 2000 cu. yds. of material, 5 yds. being estimated as a load. The mileage record shows better than an average of 80 miles per day and approximately 3 miles per gallon of gasoline. On the basis of the yardage removed, the cost per cubic yard was approximately \$.26.

Comparison With Horse Costs

The use of horse-drawn equipment on this work would have presented many difficulties and added a considerable item of expense to the construction of the tunnel. At the rate the trucks are handling the material and the distance the material has to be removed, 150 teams would have been required, entailing considerable delay in getting in and out of the excavation which is a narrow one. In the underground work teams and wagons could not be used, necessitating the use of a tramway and dump. At the San Francisco scale of prices (\$5 per day) for teamsters furnishing their equipment, a two-horse team and

a two-yard dump wagon, the minimum cost per cu. yd. of material removed would be \$.63. The teamster could not handle more than 8 yds. per day of 8 hours, while the truck handled 40 to 50 yds. in two shifts. Some of the grades encountered getting out of the cut are 12 per cent., easily climbed by the loaded truck, while it would take four to six horses to handle the wagon. On the basis of costs between trucks and horse-drawn equipment, there is a saving per working day of \$370 in the use of the motor truck to the taxpayers. A conservative estimate would place the net saving to the city on the hauling contract in excess of \$50,000.

The drivers of the trucks are not permitted to do any mechanical work, but are required to keep their engines clean. The company operates its own garage and machine repair shop near the entrance to the tunnel, there being two shifts of mechanics. Each truck is given a thorough inspection during the idle period. The cars under contract have the privilege of the shop service if they elect.

This is one of the largest motor trucking contracts ever awarded in the west and shows the adaptability of the truck to varying climatic and topographical conditions. The venture has been a paying one due to the efficient organization of the company and its service department. A. J. Crocker is president and general manager of the drayage company.



Cutting Horse Costs in Two

One of a fleet of twenty-eight trucks used by the Western Motor Drayage Company, of San Francisco, in twelve thousand foot Twin Peaks' Tunnel. These trucks are averaging 26 cents per cubic yard as against 63 cents per cubic yard by horses. This shows part of open cut where steam shovel empties directly into the truck. Half a million cubic yards of earth must be removed in this \$4,000,000 tunnel.

AUGUST 15, 1915

THE COMMERCIAL CAR JOURNAL

33

MOTOR 'BUS LINES OPERATING OUT OF BUFFALO

By GEORGE W. GRUPP

FOR the last few years the motor truck has been gradually entering in competition with the traction and railroads as a motor 'bus. The 'buses could go to places where the electric and steam cars could not. To compete against this meant too large an investment in capital with insufficient returns. Therefore some of the roads started various kinds of agitation against the motor 'bus but with little or no effect because the 'buses continued to increase and grow in strength.

It thus happened that about 4 years ago some Buffalo men realized this situation and its possibilities of a profitable investment in motor 'buses. So they set up a number of 'bus lines to compete against the electric and steam roads to a number of the suburban towns. As is perfectly natural in any kind of pioneer work some of them failed while the minority succeeded because of their greater business efficiency.

The progress of successfully operating a 'bus line, locally, was slow but sure, until at the present time there are four lines operating out of Buffalo, namely: the Akron, Marilla and Alden Lines which are owned and operated by the Buffalo and Akron Transit Company; and the East Aurora Auto Service Line owned and operated by I. G. Ogilvie and E. W. Huber.

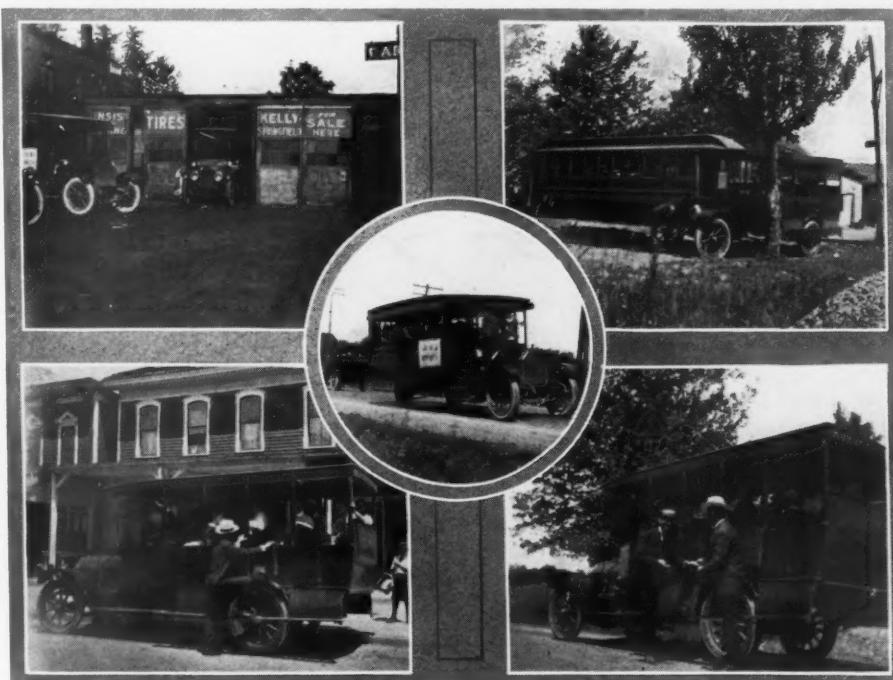
Each of these lines is run to a time schedule. Their fares are about the same as the railroads. In a few instances where the fare is a trifle more the owners argue that they get to the out of the way places where the railroads could not carry passengers. For example take the Marilla Line, the fare to Marilla by railroad is \$34 (based on two cents a mile) while the 'bus charges \$.45. The railroad sta-

tion is 5 miles from the village while the 'bus takes you direct to the village, thus the 'bus line is justified in making the additional charge. But in most instances the 'bus line has proven to be the cheaper.

Buffalo and Akron Transit Company

The Buffalo and Akron Transit Company, a domestic corporation under the direction of the Public Service Commissioners is also the East Aurora Line and started their first 'bus line 4 years ago which ran to Akron, N. Y. In 1914 they added the Alden Line and this year the Marilla Line.

They own four 'buses which were constructed by themselves at a cost of \$2200. Two of the 'buses are equipped with 24 h.p. Continental engines, one with a 30 h.p. Locomobile and one with a 30 h.p. Imperial. Three of these 'buses are in continuous operation from April to December, while the fourth 'bus is held in reserve. Each 'bus is so constructed that it can easily carry from twenty-two to twenty-seven passengers at one time. The front wheels are equipped with pneumatics, while the rear wheels have solid tires. This tire equipment is said to relieve the strain on



Buffalo 'Bus Lines Compete Successfully With the Railroads

Upper left—Where the Buffalo and Akron Transit Company houses its 'buses. Upper right—Where the East Aurora 'bus meets the street car at East Seneca, N. Y. Lower left—Just before the start at East Aurora, on the Aurora Flyer. Lower right—Paying his fare after a ride on the Aurora Flyer at East Seneca, N. Y. Center—The Akron Express passing through Eggertsville.

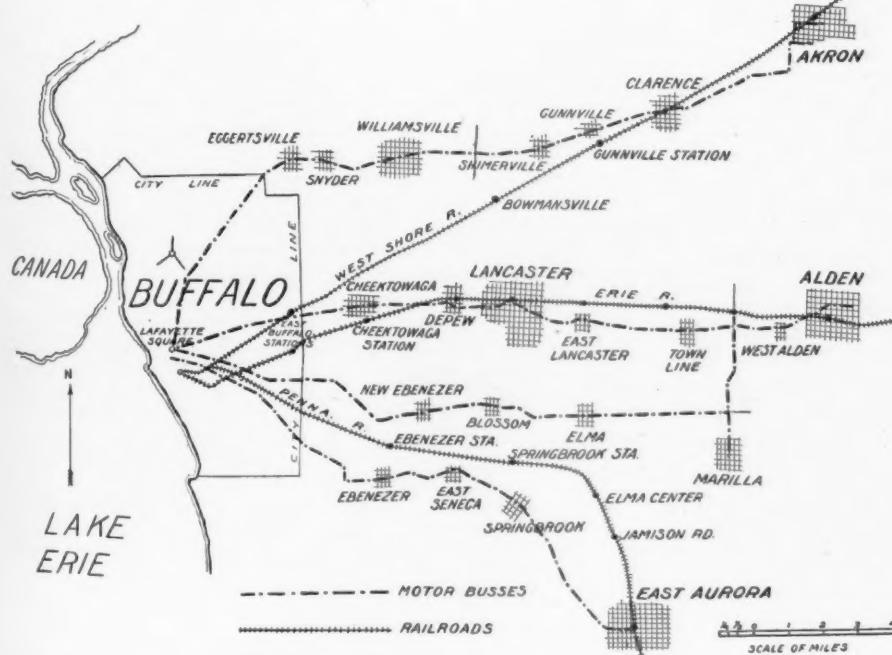
the engine while running over rough roads and the nerves and patience of the passengers. Each truck is thoroughly overhauled each year.

The Akron Line has a daily passenger traffic of ninety, the Marilla Line fifty and the Alden Line fifty. Each 'bus makes two trips a day over each line. In addition to making these runs the trucks are also called upon to do extra work in Buffalo, so that the average mileage for each 'bus is 100 miles per day. The company estimates their cost of operating each 'bus as follows:

	Per Mile
Driver	\$.036
Gasoline .....	.014
Oil .....	.003
Tires, solid .....	.007
Tires, pneumatic .....	.004
Repairs—Engine, painting body, etc.	.010
Total cost per mile	\$.074

East Aurora Line

Two 'buses are run hourly on the East Aurora Auto Service Line. One leaves East Aurora and one leaves East Seneca at the quarter past the hour from 8:15 a.m. to 7:15 p.m. This 'bus line does not run to Buffalo, but connects with the Buffalo Southern Railway Company's line at East



Map Showing Routes of 'Buses and Railroads

The 'bus lines reach towns that the railroads do not

The CCJ leads in circulation, advertising and prestige

Seneca, N. Y. Therefore if one wishes to use this line it is necessary to take a city street car to the city line and then take a Buffalo Southern car to East Seneca, a distance of 5 miles from the city limits, where it connects with the "Aurora Flyers," as they are called.

This line is operated by two individuals, namely, I. G. Ogilvie and E. W. Huber,

each independent of each other save that they operate on a schedule together. While one leaves East Aurora the other leaves East Seneca. Each bus makes twelve one way trips, or six round trips, and is owned and operated by its driver. Mr. Ogilvie owns a 50 h.p. Victor, while Mr. Huber owns a 60 h.p. Thomas. Both buses were constructed by their respective owners.

Mr. Huber, who claims he carries a daily passenger traffic of 100 people, figures that his operating expenses are as follows:

	Per Mile
Tires	\$.025
Gasoline .....	.011
Oil .....	.002
Repairs .....	.020
Total cost per mile	\$.058



THE exceptional availability of the motor car for commercial or official business uses continues to be strikingly demonstrated by experiments made by the Post Office Department, and the absolute superiority of the automobile over horse-drawn vehicles, both from a standpoint of efficiency and economy, are treated in statements just issued, one by the Postmaster General, the other by Postmaster Otto Praeger, of Washington, D. C. Commenting upon changes made which have or will result in much greater efficiency and saving in connection with the rural free delivery service the Postmaster General says:

"Memoranda are now awaiting the Postmaster General's signature providing in many localities for rural free delivery service by automobile under the clause in the resolution of Congress of March 3d last, authorizing the introduction of auto service at compensation not exceeding \$1800 a year. Where roads are good and prospective business justifies it, auto carriers will serve routes not less than 50 miles in length. This improvement will permit of further extensions of present routes. The appropriation for this service will be available July 1st. The first such routes will go into operation August 1st.

"As heretofore stated, the auto service will also be utilized gradually to install rural routes which will radiate out from the large cities. Suburban and rich truck growing areas within 25 miles of the great cities, when served thus, will get the "local" instead of the "First Zone" parcel post rate. Immediate stimulation of local parcel post exchange, especially of the "Farm to Table" service, is expected to follow. The effect upon parcel rates upon parcels weighing 1, 5, 10, 15, etc., up to 50 lbs. is shown in a table accompanying this statement.

"Though auto routes of this kind will be rural routes, the effect of their installation will be to bring the territory served within the city delivery. The statement that motor dealers and mail order houses are back of the plan to improve and extend the rural delivery service is ridiculous and does not warrant serious attention. Progressive rural patrons approve the use of modern motor vehicles in the collection and delivery of mail on improved highways. Important postal centers provide a market for products of the farm. The rate of postage to such market is reduced by the extension of the local zone through motor vehicle delivery. The benefit is obvious.

Use of Commercial Cars by Post Office

Cost of Operation of Auto Trucks in the Service of the Washington, D. C., Post Office During the Quarter Ending March 31st

By LEE L. ROBINSON

"It has been demonstrated that there is no foundation in fact for the theory that large commercial concerns seriously interfere with the successful operation of the business of country merchants by the extension of parcel post facilities. The reverse is more generally true."

Postmaster Praeger, of Washington, in his report to the Postmaster General for the year ending March 31st last, is fully as optimistic as the department itself respecting the efficiency and economy of properly handled automobile service, and he reports an intention to greatly increase this service. Postmaster Praeger submits figures dealing with details as to cost of service of automobiles already established, going into details of mileage, hours of service, gasoline used, cost of oil, grease, parts and accessories, cost of mechanics, chauffeurs' salaries, garage cost, depreciation per month, tire depreciation, etc., which is illuminating. Extracts from his figures and his report are as follows:

While I have given thus a running account of the operations of this office during the past year, showing the expansion of the service, notwithstanding the very substantial saving in the cost of operations, there are two phases of the year's work to which I desire to call attention in detail as being of interest to the postal service generally. One is the inauguration and successful operation of a combined screen-wagon and city collection and delivery service by government owned automobiles and the other is the successful operation of the mail service from one central office, instead of from a number of widely separated mailing and carrier stations.

In the early stages of my administration, in acquainting myself with the details of all the work, I was struck by the great cost

of our screen-wagon service, which was rendered under a contract at \$.375 per mile. It developed that there were two other contracts, one amounting to about \$.22 per mile for the delivery of parcel post matter and a third a horse-hire contract of \$594 per year per mount. Each was a contract for specific work, and the services of the equipment under one contract could not be used for the work under the other contract. A thorough investigation was then started to ascertain the cost of operating a fleet of automobiles, which should gradually merge the work done under the three separate and inelastic contracts into a combined screen-wagon and city collection and delivery service, for which Congress authorized an expenditure in an experimental way.

For a starter, I recommended the purchase of a few automobile trucks, and estimated in my original recommendation the cost of this service to the Government at \$.108 per mile, not including the saving made by carrying carriers to their routes. After a thorough and independent investigation on the part of the Post Office Department the experiment was authorized for Washington, and six trucks were bought. There are to-day nine of these trucks in operation under this office, and the cost per mile of this combined service has been gradually reduced to \$.0917 per mile, or more than a cent a mile under my original estimate. The cost of operation allows for a depreciation of 20 per cent. per year on the three-quarters and one and a half ton White trucks and 33½ per cent. per year on the Ford trucks. It allows for tire depreciation and all other elements of cost at the exact expenditure for these articles, and charges up against the cost of the operation of these trucks all labor performed by employees of the post office other than those specifically employed for the operation and maintenance of the machines, even

Detailed Cost Figures of Trucks Used in Mail Service

Truck No.	Mileage	Hours Service	Gasoline Gals.	Oil and Grease	Repairs	Total Cost
1	3,224.2	650.05	357	44.38	4.02	21.88
2	3,691.1	953.02	463	59.85	3.59	21.89
3	6,246.9	1,102.25	531	68.44	4.70	21.89
4	4,323.1	1,119.05	472 1/2	61.21	4.32	21.89
5	6,592.7	1,227.15	612	77.91	5.54	21.89
6	5,836.4	1,119.35	512 1/2	65.82	5.15	21.88
7	3,975	664.45	312 1/2	36.77	3.03	14.88
8	414	98	62	7.13	.30	4.84
9	1,904	194.50	135 1/2	15.80	1.32	9.63
Totals	36,207.4	7,129.02	3,458	437.31	31.97	160.67
			Garage and Mechanic	Salary Driver	Depreciation Equipment	Depreciation Tires
1	59.99	176.19	61.39	51.46	419.31	
2	60.00	169.11	64.62	58.93	437.99	
3	60.00	233.44	74.33	97.53	560.33	
4	60.00	154.07	75.14	68.03	444.66	
5	60.00	341.42	82.50	104.28	693.54	
6	59.99	301.11	75.29	92.38	621.62	
7	36.10	184.40	43.69	63.60	382.47	
8	12.38	24.05	2.65	6.21	57.56	
9	31.54	58.43	7.30	27.37	146.39	
Totals	440.00	1,637.22	486.91	569.79	3,763.87	
	Average cost per mile for service, 10.4 cents.					

though the work done on the trucks is incidentally absorbed by those men in connection with their regular work, and does not cost the Department a cent additional. This is a closer and more severe accounting against the cost of maintaining and operating the service than would be conducted by an individual firm or corporation. The only item that would enter into a commercial cost accounting that does not enter into a government cost accounting is the usual 6 per cent. interest on the money invested. Were this item included in the post office accounting in its automobile service and divided between nine machines, or apportioned to its 13,000 or 14,000 miles running per month, the increase over our monthly report of cost would be very small. As a matter of fact outside of the cash outlay of \$16,475 for our automobile equipment, there has been a cash outlay for operation and maintenance of only \$4927.97. The screen-wagon service alone, which was replaced by this combined service, would have cost for this period \$7700 or more.

But our combined service does almost twice the screen-wagon work which was rendered under the late contract; in addition, it saved street car tickets in taking carriers to their routes in the sum of \$1255.16 to March 31st, and \$874 more by retiring four wagons engaged in mail and parcel post delivery. Incidentally, it has saved innumerable small items of drayage and other service, besides rendering other service by reason of its flexibility and availability for all kinds of work.

In view of the interest that has been manifested in the successful and economical operation of government-owned automobiles by the Washington Post Office, the following figures showing average cost and performance of the service per month since the service was instituted, are cited:

Miles operated per month.....	11,332.74
Hours of service per month.....	2,378.06
Gasoline per month (gallons).....	1,146.00
Oil, grease, parts, and accessories per month.....	\$48.74
Mechanic service per month.....	97.81
Chauffeurs' salaries per month.....	535.26
Garage rental per month.....	51.31
Depreciation in equipment per month.....	166.14
Tire depreciation per month.....	187.41
Cost of service per month.....	1,288.49
Sacks and pieces of mail dispatched per month.....	18,339.81
Sacks and pieces of mail collected per month.....	18,839.81
Parcel post packages delivered per month.....	7,877.77
Carrriers trips to routes per month.....	5,578.52

The following record for 5 months shows the saving to the department in the delivery of parcel post by government-owned automobiles as compared with the contract service:

Contract Autos		
Month	Parcels	Cost
November	8,227	\$251.94
December	6,358	160.14
January	7,159	240.28
February	6,752	228.34
March	8,247	240.28
Totals	36,743	\$1,120.98

THE COMMERCIAL CAR JOURNAL

especially in the handling of the mails, through wiping out the hard and fast lines between the mailing and delivery sections; and it resulted likewise in an important saving through the reduction of the number of supervisory employees.

An incompletely reform—one which we have been able to undertake only in an experimental way—is the substitution of automobiles for horse collections of the city mail. The plan is to have the collections made from the letter boxes by foot carriers and deposited in master boxes at contract stations, from which the mail is to be taken at fixed intervals by our automobile trucks. Tests of a carefully worked out plan for East Washington show that with one automobile we can retire four mounts at a saving of \$600 per year by this single change. Considering our large collection area and the number of mounts required in this service, I find here a field which gives promise for the introduction of an up to date automobile collection at a great saving over the horse collection system.

Postmaster Kinnear, of Columbus, Ohio, has made a radical change in the method

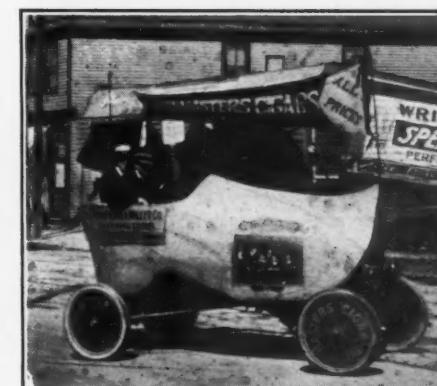
NEW FEATURES ON BIG MOTOR TRUCK WHICH AID IN ITS OPERATION

The latent possibilities of a motor truck are best realized when full use is made of the truck's numerous mechanical features.

A live example is shown in the illustration of a five-ton Mack truck, made by the International Motor Company, New York City, equipped with three main power features, power dump body, power winch with large winding drum, and abutting nigger-heads. By running a line around the nigger-heads and making fast to a tree or other stationary object the truck may pull itself out of soft ground or ascend steep inclines with its full load. Heavy objects may be drawn on to this truck by the winch and may be hoisted to a considerable height above the ground at destination with the aid of a block and tackle. As a general utility truck for diversified work this latest Mack equipment should prove a valuable aid to contractors.



Mack Dump Truck
With power dump, power winch and abutting nigger-head



A Novel Body

A Ford with a wooden Dutch shoe for a body, as used by the Thompkins and Miller Company, Buffalo, advertising the Dutch Masters Cigars.

How J. F. Kulp & Sons Company Use Their Motor Trucks in Carting, Trucking and Hoisting Business



J. F. KULP & SONS COMPANY of Buffalo, N. Y., who conduct a general trucking, carting and hoisting business, especially articles of an unusually heavy nature, such as machinery, boilers, smoke stacks, etc., have been operating five five-ton Pierce trucks; one two-ton Pierce and one one and a half ton Autocar in conjunction with their scores of horse-driven vehicles, with great success and profit. Ninety per cent. of the work being done by their trucks would have been impossible for them to handle with horse-driven vehicles.

One of the unique occupations of their trucks is what they call "First Aid to the Injured Automobile," or automobile wrecking service; in fact, this is the only firm in or near Buffalo which uses its trucks for such purposes. Night and day one or more of their trucks is in readiness to answer the call of any owner of an injured automobile. No situation seems to be too difficult for them to handle. Within five or ten minutes after the call has been received they are on their way to the wreck. As high as five to six automobiles are hauled to the nearest garage, or wherever the owner wishes, every night in the week.

For this service they charge \$2.50 an hour during the day and \$3 an hour for night service. If an additional man besides the driver is needed then an additional charge of \$.50 per hour per man is made.

The owner saves money by using this motor truck service. First, because it requires less time to haul the wrecked car to a repair shop than by horses and his machine might be ready for use the next morning; and because the charges made for the slow horse-driven vehicle would far exceed the cost of hauling by motor truck.

Previous to the installation of motor trucks for this kind of service horses were used, but at a great disadvantage, both to themselves and the owner of the damaged automobile. With horses, if a wreck occurred a distance of 25 miles from Buffalo at 8 p.m., the team would not leave the stables until about 2 o'clock the next morn-

ing and would not be back again until 10 p.m. on the same day they left, 20 hours on the road, and would not be in fit condition again before they had a 24-hour rest. To regain the flesh lost would require months of good feeding and light work.

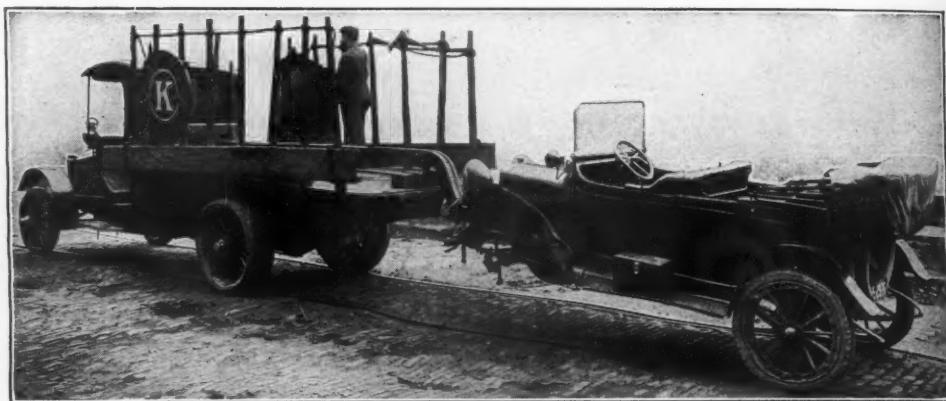
With their motor trucks they are able to accomplish the same feat in 6 hours.

Specific Case Showing Time and Labor-Saving Advantage

This firm has demonstrated the ability of trucks to compete against the railroads to short distance points. Take, for example, a shipment to the railroad and freight house which formerly had to be made by horse, for the Lackawanna Steel Company,

day before the freight car would arrive at the steel plant and another loading onto a wagon would be necessary. Thus two days and six handlings would be required. Now with the motor truck the Kulp people claim that if such an order is received at the office at 11 a.m. it is at the steel company's plant, within the grounds and delivered at any point they choose and the trucks back at the garage by 4 p.m. It requires less time and only two handlings against six.

"In addition to using our trucks as auto emergency wagons and freight handlers," said Mr. Eugene Kulp, a member of the J. F. Kulp & Sons Company, "we use them for hoisting, which is a very important part of our business.



Kulp's Way of Giving "First Aid to the Injured"
If the car is very badly damaged it is loaded upon the truck

Lackawanna, N. Y., a distance of 5 miles from the lower part of Buffalo. If an order were received from a shipper say at 11 a.m. to send a team over to his place to deliver some goods to the railroad freight house, the team would probably not arrive at his place before the next morning as usually they are busy carting other things all day the order is received. After the team arrived it would have to be loaded, and unloaded again at the freight house onto the freight car. It would be the next

"With our trucks we are able to compete with any of our hoisting competitors at a distance of 25 miles from Buffalo and get there quicker than they can."

Better Than Horse or Rail

"Let me tell you of a little experience we had recently with one of our trucks. A man called up from Akron, N. Y. (a distance of 22 miles from Buffalo), one morning asking us to get a new generator out to his plant that day because their old one was broken down and they had to stop their plant. Well, after he called us up he had to order one and we immediately went after it, loaded it on our truck and delivered at Akron, installed it and back to Buffalo again by 6 p.m. that same day. Now with a team of horses or even by railroad this quick service would never have been possible."

Standard Forms Used for Records

When an order for carting, hoisting or trucking is received at their dispatcher's office, an order is made out in triplicate form. One is given to the driver, and two are for the office, one acting as a check on the other—useful in the event of loss. The dispatcher then routes and assigns the orders to different drivers, the orders then being temporarily filed. The dispatcher can tell you the whereabouts of the driver at any particular time of the day.



Truck Carries Equipment for Hoisting Smokestacks

This truck was loaded with this equipment in thirty-five minutes and was on its way to Lockport, N. Y. (25 miles from Buffalo), to hoist a large smokestack. Emergencies of all kinds are handled by Kulp with his trucks.

**Wagon Commonly Used as Trailer**

When the required equipment, as in this instance, is too much for the truck, Kulp does not hesitate to hitch loaded wagon in the rear, as a trailer

Also a night and day report is made daily by the man in charge of the garage and stables. Each driver has to give a daily account of his gasoline and oil consumptions, etc. If in any event a truck has been ruled out of service, this fact must be reported to the office at once, giving the cause, the number of the truck, the time the truck went out of commission and the name of the driver. Such immediate reports this firm finds saves much delay in meeting their daily program of work.

The trucks average a daily mileage of 35 and their cost of upkeep, etc., has been itemized as follows:

Cost of Operating Five-Ton Pierce Trucks Per Mile, Thirty-five Miles a Day

Gasoline	\$.045
Oil .....	.007
Repairs .....	.017
Tires .....	.019
Wages .....	.080
Depreciation .....	.060
Total cost	\$.228

Quite a number of American made trucks are being used on London streets for omnibus work; and during the last 2 months the Great Western Railroad has placed thirty more American trucks in that service. A noteworthy fact is that these trucks equipped with gear truck drive axles have passed every test prescribed by Scotland Yard for quietness of operation.

PHILADELPHIA HAS A SUCCESSFUL AUTOMOBILE PACKAGE DELIVERY SYSTEM

By J. HOWARD PILE

An instance of a successful automobile package delivery system is that of the Terminal Market Delivery Company, operating in Philadelphia and vicinity. This company was organized with the idea of making deliveries by automobile of market purchases bought by patrons of the Reading Terminal Market, which is one of the largest and finest markets in the world. It was found profitable, however, to take on outside work also, and at present Mr. C. B. Harvey, the superintendent, states that the business is about equally divided between the delivery of marketing and the delivery of outside goods.

There are several important radical departures in the operation of this system which show considerable advance in modern methods and tend to prevent leaks and losses. The most important of these are the stamp prepayment rule and the delivery of all parcels and packages to the receiving window so that there is no picking up on the outbound trip.

The receiving station is divided into convenient sections so that packages can be sorted out for the different routes, piled on hand trucks and loaded onto the trucks about 100 ft. away. All goods must be de-

livered to this receiving station, prepaid by attaching the proper number of stamps as indicated on the schedule of rates. These stamps are issued in denominations of \$0.05 each, and may be purchased in any quantity. Books of 250 stamps are sold for \$12.50. The receiving station is open daily from 7 a.m. to 3 p.m., Saturdays 5 a.m. to 3 p.m., and Fridays 7 a.m. to 9 p.m. All routes close at 8:30 a.m. and 1:30 p.m. except Saturdays, when they close at 6 a.m. and 12:30 p.m.

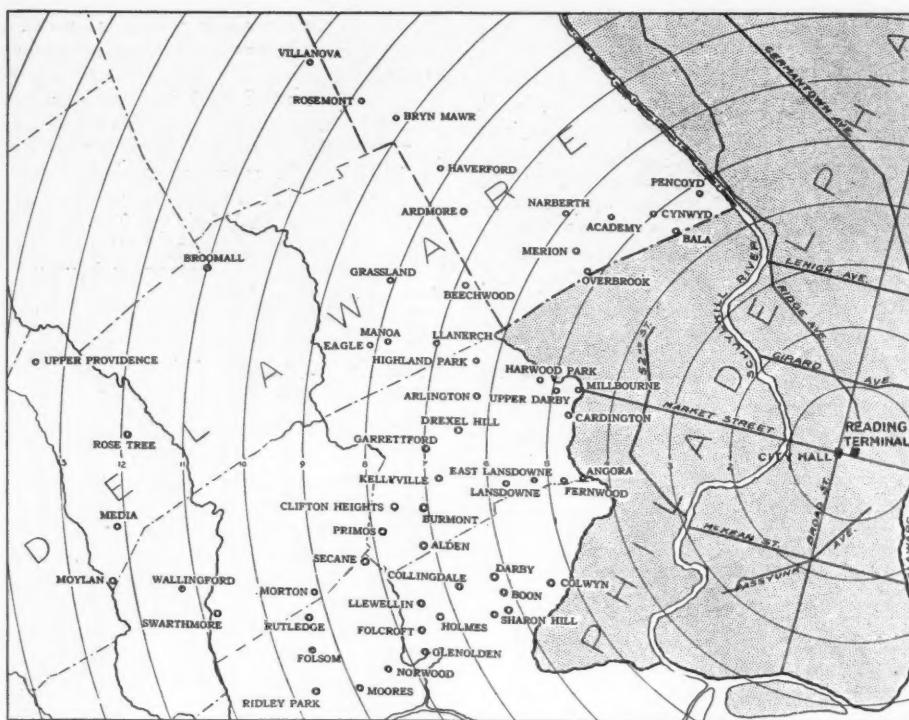
The following table gives a list of points to which the delivery system extends at present with rates. Incoming packages will be carried at the same rates:

Zone	RATES		
	10 lbs. and under	11 to 20 lbs.	21 to 30 lbs.
1 Academy	5	10	15
1 Alden	5	10	15
1 Angora	5	10	15
2 Ardmore	10	15	20
2 Arlington	10	15	20
1 Bala	5	10	15
2 Beechwood	10	15	20
1 Boon Hill	5	10	15
2 Brookfield	10	15	20
2 Brookline	10	15	20
2 Broomall	10	15	20
2 Bryn Mawr	10	15	20
1 Burmont	5	10	15
2 Burnside	10	15	20
1 Cardington	5	10	15
1 Clifton Heights	5	10	15
1 Collingdale	5	10	15
1 Colwyn	5	10	15
1 Cynwyd	5	10	15
1 Darby	5	10	15
2 Drexel Hill	10	15	20
1 East Lansdowne	5	10	15
2 Faraday Park	10	15	20
1 Fernwood	5	10	15
1 Folcroft	5	10	15
2 Folsom	10	15	20
2 Garrettford	10	15	20
1 Glenolden	5	10	15
2 Grassland	10	15	20
2 Haverford	10	15	20
2 Holmes	10	15	20
2 Highland Park	10	15	20
1 Kelleyville	5	10	15
1 Lansdowne	5	10	15
2 Llanerch	10	15	20
1 Llewellyn	5	10	15
2 Manoa	10	15	20
2 Maple	10	15	20
2 Media	10	15	20
1 Merion	5	10	15
2 Millbourne	10	15	20
2 Moores	10	15	20
2 Morton	10	15	20
2 Moylan	10	15	20
1 Narberth	5	10	15
2 Norwood	10	15	20
2 Oakland	10	15	20
2 Oakmont	10	15	20
1 Oakview	5	10	15
1 Okaola	5	10	15
1 Overbrook	5	10	15
2 Pencoyd	10	15	20
2 Penfield	10	15	20
2 Primos	10	15	20
2 Ridley Park	10	15	20
2 Rosemont	10	15	20
2 Rose Tree	10	15	20
2 Rose Valley	10	15	20
2 Rutledge	10	15	20
2 Secane	10	15	20
1 Sharon Hill	5	10	15
2 South Ardmore	10	15	20
2 Swarthmore	10	15	20
2 Upper Darby	10	15	20
2 Upper Providence	10	15	20
2 Villanova	10	15	20
2 Wallingford	10	15	20
1 W. Philadelphia	5	10	15
2 Windcliff	10	15	20
1 Yeadon	5	10	15



One of the Terminal Market Delivery Company's Cars
This firm uses five Whites, four of fifteen hundred pounds capacity and one of one and a half tons capacity

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?



Philadelphia and Vicinity

Showing territory covered by the Terminal Market Delivery Company. Circles show miles distant from Reading Terminal

Special rates for heavy packages, which include barrels, large baskets, crates, hampers and such carriers as when filled exceed 30 lbs., are as follows:

Rates for General Merchandise

	31 to 50 lbs.	51 to 100 lbs.	Each additional 25 lbs. or fraction
1st Zone	20c	35c	5c
2nd Zone	30c	45c	5c

Fruit and Produce Only

	31 to 50 lbs.	51 to 100 lbs.	Each additional 25 lbs. or fraction
1st Zone	15c	20c	5c
2nd Zone	25c	35c	5c

Extracts from some of the rules and regulations will give further information as to the operation of the system:

C. O. D. packages are carried at regular rates, plus an additional charge for return of money as follows:

On sums up to and including \$10..... 5c
On sums up to and including \$25..... 10c
Each additional \$25

5c
C. O. D. packages must be so marked, accompanied by bill and carry the additional stamps for return of money.

Fragile articles received only at owner's risk, and must be indicated.

Wet articles must be so packed that no damage can result to other goods. Should such occur, shipper of package will be held responsible for all damage.

When house to which package is addressed is closed, package may be left with neighbor at driver's discretion unless otherwise ordered. Card of notification will be left under consignee's door.

The company assumes responsibility only as common carriers. Not responsible for loss or delay due to accidents or causes beyond control.

Tags must be written plainly and include name, street, number and town. If no street number, give road and nearest intersecting road or landmark.

Private hampers may be left permanently at Receiving Station, and all packages addressed to owner will be packed and delivered at regular rates. Such hampers will be returned and stored at station free of charge.

This company has been in active operation for some months now, and the business is constantly growing. As soon as the demand warrants it, new routes will be included.

NEW GIBNEY SOLID-TIRE LITERATURE

A splendidly gotten up booklet has just been issued by the Gibney Tire and Rubber Company of Philadelphia, in which the process of manufacturing Gibney solid tires is explained from the crude gum to the finished product. Numerous interior views of the factory and actual manufacturing scenes are shown, thus giving the reader the equivalent of a "personally conducted tour" through the factory.

MOTOR HAULING AS A BUSINESS HAS GROWN IN CHICAGO. STAR MOTOR DELIVERY COMPANY AN EXAMPLE

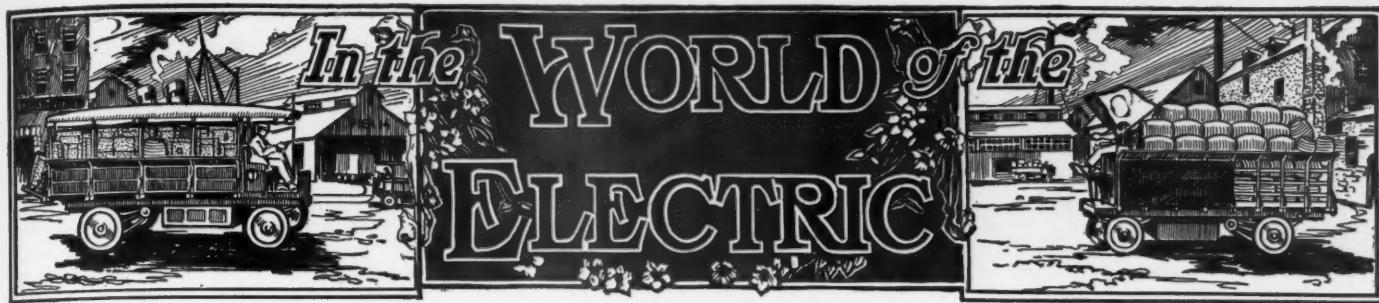
In supplanting horse-drawn vehicles, the motor truck is now very much in evidence in Chicago. In fact, motor trucking itself has become a business of great magnitude and one requiring a large capital to swing successfully, although there are numerous examples in this city among the teaming interests, where haulage within a very recent period with one truck is now increased in many instances to moderate and even large motor-truck fleets; and many of the great commercial enterprises have contracted with several of the motor-teaming concerns for their haulage, abandoning horses and depending wholly on the motor truck. In the produce commission business, where work has to be done for long or at unseemly hours, the motor truck has become decidedly popular, especially on account of its availability.

For general haulage the Star Motor Delivery Company, with a fleet of eighty-seven Mack trucks and two Saurers—of varying capacities of 1 to 7½ tons, trailers included, has in its fleet trucks in service from one to nine years. The service is decidedly strenuous as it is continuous for 24 hours daily. While efficiency or economy figures cannot be secured from them it is sufficient to say that their existing contracts practically cover their total number of motor trucks. This would seem to prove the superiority of the motor truck over any other mode of trucking.



Some of the Star Motor Delivery Company's Fleet of Mack Motor Trucks

This company has for nine years made a business of handling for the merchants of Chicago by motor trucks



Parcel-Post and Mail-Collection Tests of the Electric Vehicle

By A. JACKSON MARSHALL, Secretary of the Electric Vehicle Association of America

AT this time, when the Government is accepting bids for transporting the mails in one hundred odd cities in the following States—Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Massachusetts, and New York—it will be particularly interesting to note some performances of electric vehicles in this class of service. One especially interesting test which is reported here was conducted in person by Mr. E. M. Jackson, of the Denver Gas and Electric Light Company.

Electric Truck Demonstration for the Parcel Post With One Thousand Pound Walker, April 20, 1915

Running Time

Start	9.51 a.m.
Finish	5.03 p.m.
Gross Time—7 hours 12 minutes.	
Time Out—49 minutes.	
Net Time—6 hours 23 minutes.	

Mileage

Eastern Delivery—Mileage, 23.1.
Southern Delivery—Mileage, 23.2.

Current Consumption

Eastern Delivery—A.H. required, 99 or 4.24 per mile.	
Southern Delivery—A.H. required, 96 or 4.16 A.H. per mile.	
Total Ampere Hours, 195.	
K.W.H.	
Capacity of battery	18.14
Capacity of battery required in demonstration	0.07
Charging current necessary to replace 10.07 K.W.H.	14.1
Cost of 14.1 K.W.H. at 3.60 per K.W.H.	\$5.076
Cost per mile for current .....	.01096
Cost per stop .....	.0035
Cost per package .....	.00338

Resume

One hundred and fifty packages delivered by 143 stops, covering 46.3 miles, in 6 hours and 23 minutes.

The time consumed in delivering to and making the delivery of each stop was 2 minutes and 40.7 seconds.

The average time of delivering each package was 2 minutes 33 1-5 seconds.

The average number of stops per mile was 3.067.

Electric Truck Demonstration for the Mail Collection, April 21, 1915

Running Time

Start	5.35 p.m.
Finish	12.29 a.m.
Gross Time—6 hours 54 minutes.	
Time Out—2 hours 28 minutes.	
Net Time—4 hours 28 minutes.	

Mileage

Eastern Collection—Mileage, 16.3.
Northern Collection—Mileage, 10.2.

Total Mileage, 26.5.	
A.H. required 75 or 4.6 A.H. per mile.	
A.H. required 48 or 4.07 A.H. per mile.	
Total Ampere Hours, 123.	
Capacity of battery	18.14
Capacity of battery required in demonstration	8.85
Charging current necessary to replace 8.85 K.W.H.	12.39
Cost of 12.39 K.W.H. at 3.60 per K.W.H.	\$0.446
Cost of mile for current .....	.017
Cost per stop .....	.00325
Cost per collection .....	.003

Resume

One hundred and forty-seven collections made, with 137 stops, covering 26.5 miles, in 4 hours and 28 minutes.

The time consumed in driving to and making the collection at each stop was 1 minute 57 1-3 seconds.

The average time of driving to and making each collection was 1 minute 49 2-5 seconds.

The average number of stops per mile was 5.17.

In New York City

For postal service in the United States it seems evident that motor vehicles must necessarily supersede the older horse vehicle equipment, and during the past 5 or 6 years a number of motor vehicles have been employed. Conspicuous among these has been the satisfactory performance of twenty to thirty electrics in service in New York City during the 4 years' contract period closed last year.

Twelve of these electric trucks are now in service, making deliveries from nineteen postal sub-stations in New York City to addresses, of large and heavy packages sent through the parcel post. This service was begun with the inauguration of the parcel post, seven vehicles having been used during the first months, fifteen for a subsequent period, and later, due to changes in the system, this number has been reduced to the twelve mentioned.

During one winter month, in 27 days, these machines traveled 7111 miles and delivered 98,243 parcels. At this rate the parcel post truck fleet covered an average distance of 263 miles per day or 22 miles per individual vehicle. These vehicles, it should be noted, have, however, capacities of 45 miles per charge. Deliveries were made at the rate of 3628 parcels per day, or about 303 per day per vehicle. The average distance traveled per package delivered was 0.0724 miles, or 382 ft. At the rental paid by the Government for this delivery service the average cost per parcel was 3.3 cents, not including, however, the salary of the

carrier who accompanied the truck on its round and made the actual deliveries to addresses.

In addition to the electric truck just mentioned a number of large machines are used for mail haulage between the New York City depots and postal stations. Some of these cars have been in service 5 or 6 years, having been used 24 hours per day in the year during much of this period. Such mail service, according to those familiar with its requirements, is one of the most exacting to which motor trucks can be applied.

Parcel-Post Delivery Data From Indianapolis

The three electric delivery wagons used by the Indianapolis Post Office have proven very reliable and it is declared have never failed to perform any service that they have been called upon to do. In point of speed and mileage they have been found ample for parcel delivery, for the requirements in this direction are well within the range of their capacity. In a 7-hour working day these electric wagons averaged 271.5 parcels in 189 stops over a distance of 18.75 miles. The cost of the day's run, not including the wages of the carrier, was \$5.60. The unit costs were as follows:

Stops per mile	6.02
Cost per stop	3.25 cents
Cost per parcel	2.06 cents
Cost per parcel mile	0.0011 cents

Do Work of 850 Horses

The comprehensive delivery system of Marshall Field & Company, Chicago, is one of the best examples of the success of the electric in a house to house delivery. It should be borne in mind that the parcels post delivery is so similar to any house to house delivery such as department stores use, that their successful operation by such organizations as Marshall Field should have considerable weight with the Post Office authorities. There are at present 230 electrics used by Marshall Field which have an average mileage of 28 to 30 miles per day, some of the lighter vehicles traveling as far as 40 miles per day. To do the same work from 850 to 900 horses would be required.

The following are some of the large electric users and the number of electric trucks in their fleet:

	Electrics
Ward Baking Company	610
Adams Express Company	326
American Express Company	220
Jacob Rupert	145
Geo. Ehret Brewery	136
Commonwealth Edison	114
N. Y. Edison	130
Gimbels Brothers	119
Carson Pirie & Scott	67

The firm of Chas. A. Stevens Brothers, of Chicago, state: "We were the first company in Chicago to install an electric for delivery purposes. That was in 1897. We find the electric very well adapted to our work. Contrary to usual practice this company has its electrics in successful use in suburban delivery."

Such statements from conservative houses mean a great deal and the above list of installations bears witness further to the possibilities of the economy of the electric when applied to the functions desired in the haulage and delivery of parcel post material. The electric vehicle is particularly well suited for house to house delivery or other transportation work requiring frequent starting and stopping due to the extreme simplicity of operation and absence of all gear shifting. The Electric Vehicle Association has endeavored to stimulate interest in the electric vehicle in parcel post service especially and the above reports testify to the success and economy of the storage battery trucks in this capacity.

RADIATOR REPAIRING AND REMOVING RUST FROM SAME

Which is the best way to solder broken tubes in a radiator—with a soldering bit, a blow torch, or an electric soldering iron?

How can I remove rust from a radiator? The water heats very much. The pump works good. I had the engine all cleaned last winter, but it did the same after cleaning, so it is not from carbon. I have been told that rust in the radiator will cause heating.

J. K. M.

New York City.

Repairing a radiator is no easy matter, but with a certain amount of care anyone who can dexterously handle a soldering iron should be able to make a good job of it. The usual procedure is to scrape the leaky part, wet it with a soldering solution and apply the solder in any manner convenient. Either a hand or an electric soldering iron is preferable to the blow torch. A blow pipe can be used if it is a sharp pointed one such as jewelers use. A

SOME COST FIGURES OF ELECTRIC FIRE-FIGHTING APPARATUS

The Electric Vehicle Association of America, through its secretary, has gathered together some data on the cost of electrically propelled fire apparatus, which proves very conclusively the economy of the electric in comparison with horse-drawn apparatus.

The first storage battery fire engine in the country was No. 217, of the New York Fire Department, which was placed in service in 1912. It was converted into an electric from a horse-drawn piece at a cost of \$4000, and the bills for repairs and renewals during two years were \$744.29, \$486.97 of which was for battery renewals. Adding depreciation and the cost of charging, the operation of this engine has cost the city \$1370.03. The cost of a similar piece of apparatus but which is horse drawn is \$1469.06 for the same length of time.

Springfield, Mass., has several pieces of electrically propelled apparatus and Chief

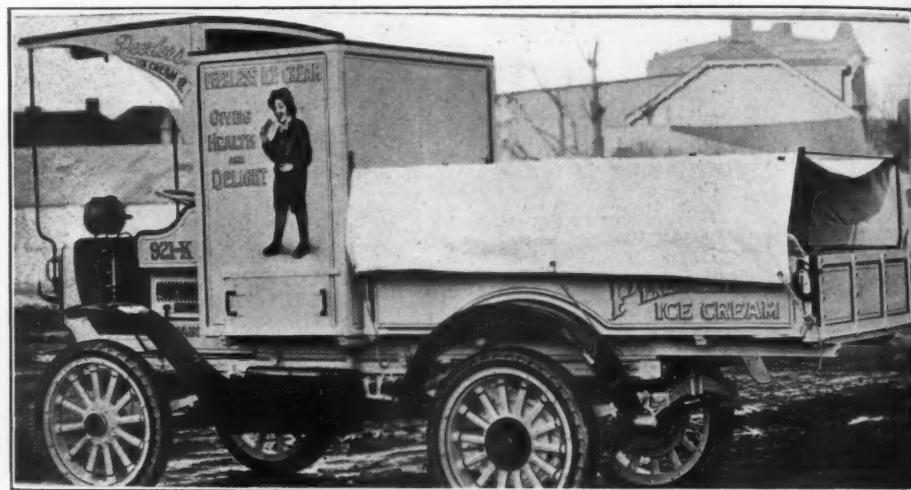
Engineer W. H. Daggert estimates the cost as follows:

Renewal of plates (in 4 years).....	\$500.
Renewal of separators (in 2 years) 80 cells at 35c.....	28.
Charging batteries (in 4 years at \$60. per year)	240.
Broken jars (4 years at \$7. per year)	28.
Total in 4 years	\$796.
Total in 1 year	199.

It is estimated that the cost of horses to do the same work would be from \$500 to \$600 per year.

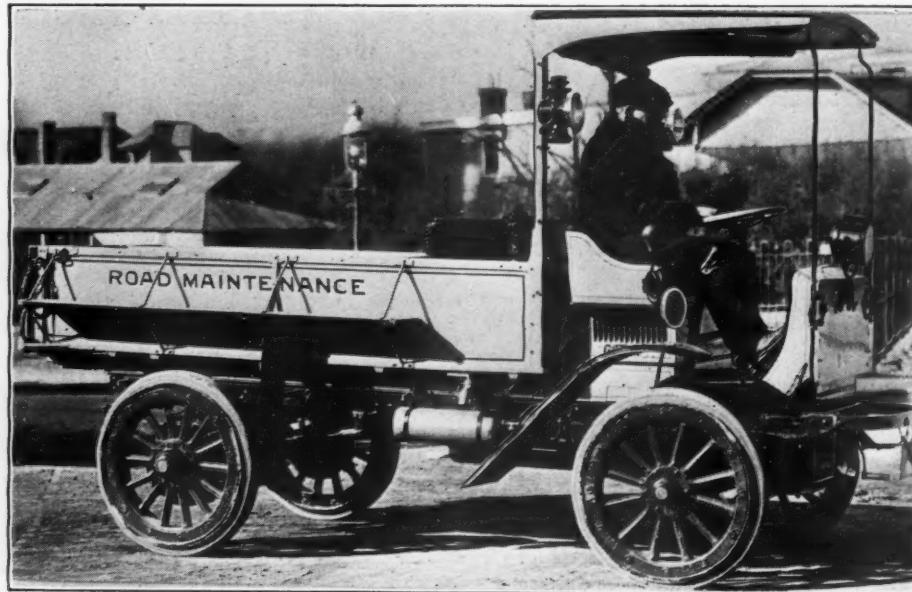
The New England Section of the National Electric Light Association will hold its seventh annual convention at Kineo, Maine, from September 14th to 17th.

The Muskogee Electric Traction Company, of Muskogee, Okla., will shortly call in all but two of its street cars, and run buses on the principal thoroughfares instead. R. D. Long, manager, states that motor buses can be operated more cheaply than street cars and not be hampered by state laws and city commissions.



Autocar Ice Cream Body

On the front are compartments for ice and salt. On the rear they carry cans of ice cream. By this arrangement they do not have to use tubs, as when the ice melts they can supply more from the compartments in front.



Road Maintenance Autocar

This body has a tank holding seventy five gallons of oil in the front; in the rear, sand or other road materials can be carried, also tools

large one will not do, as it is likely to loosen up some other joint. If the soldering iron can be used this is probably the best method, but in many cases even a small soldering bit cannot be introduced where the soldering is to be done. If the blow torch is used and there is danger of adjoining seams melting loose a good plan is to place wet rags over those parts not to be soldered. This will prevent the temperature from reaching the melting point of solder.

The electric iron is without doubt much handier than the plain bit and charcoal fire pot, but it should not be placed in the hands of a careless workman who is liable to forget to turn off the current when through using it.

Your radiator being of copper will hardly rust. But it may be filled with mud or lime; most likely lime. Caustic soda or potash will often cut loose the deposit and allow it to be washed out. But if it is a lime deposit you had better fill the radiator with ten parts water and one or two parts muratic acid. This will eat the lime and loosen the mud. In mixing this, be sure to pour the acid into the water.



Road Legislation and Development in Great Britain

By OUR FOREIGN CORRESPONDENT

THE other day I had the privilege of driving an American two-ton truck in London while its American driver—one of the most delightful men I have met for a long time—pointed out that it had been designed simply and strongly for work in America, and therefore would be likely to find work on British roads—the finest in the world—a soft job. That was how the roads in Great Britain impressed him. Whether he was right or wrong I should not care to say categorically. Probably he was right. In the early days of the automobile movement the French roads were undoubtedly the finest, the *routes militaire* being maintained in far better condition than the average highway in the United Kingdom; but since then in France the average of maintenance seems to have gone down, while in Great Britain it has improved, so that, even if we except the roads of northern France, which are at present cut to pieces by military traffic, probably the British roads are the better. But they are very far from perfect.

Road Regulations and Conditions

With the coming of the automobile it was not only the roads that had to be adapted to altered requirements, but the legislation and machinery for keeping them in order. Almost ever since the introduction of the local government principle and county councils, the main roads have been under the control of the councils of the counties through which they pass, while the less important byroads have been looked after by the local councils—either urban or rural district councils. For the main roads, the National Exchequer found half the cost, the county council the other half.

Such a system, though necessarily disjointed, worked well enough in the days of the horse. The roads chiefly carried local traffic in those days, and it was reasonable enough that those who benefited by the roads should pay for them; also that those who found the money should have the control. But with the increasing use of the motor, long distance road traffic increased enormously, and with the natural increase of wear and tear the road authorities found themselves involved in increased expenditure of local money, the benefit of which was only partly felt locally.

Before the 1909 Finance Act automobile traffic paid slight taxes, but the county and district authorities who had to pay for the roads benefited little by their taxation. The registration fee, whether it was for a com-

mercial car, private car, or motor cycle, went to the road maintaining authorities, but this only amounted to \$5 for a car and \$1.25 for a motor cycle. The driver's license of \$1.25 also went to the county authorities, but both these small amounts, not being earmarked by the road funds, only benefited the roads indirectly. Before 1909 private cars paid a tax of \$10.05 if under 2 tons weight unladen, \$15.75 if over 2 tons, but this was paid to Inland Revenue, and had nothing to do with road upkeep. Cars used exclusively "for merchandise or for the purpose of husbandry," paid nothing even to Inland Revenue.

In those days but little had been done in tarred road surfaces, and it was found that fast cars especially wore the roads into potholes owing, it was thought, to the suction action of the pneumatic tyres. In the neighborhood of towns too the heavy, solid rubber-tyred vehicles were increasing in numbers, and especially where bus services were regularly running, showed a tendency to wear the road into corrugations.

The Finance Act of 1909, in the first place, increased taxation on private cars on a horsepower basis, the horsepower being based on the formula of the Royal Automobile Club, which was adopted by the Treasury. This is as follows: B.H.P. = $.4d^2N$ where d = diameter of cylinder in inches. N = number of cylinders in inches.

But this tax ignored the amount of road wear caused by the individual car, and this point was touched by a tax on gasoline of 6 cents a gallon on all used by private cars, and 3 cents a gallon on the gasoline used by commercial cars.

The Central Road Authority

Long before these enactments came into force it had been decided to form some central advisory authority and the taxation was imposed with this view, for though the Road Board was not formally called into existence until the following year, it was arranged in advance that the money from the petrol tax should be paid to the Board when constituted, and by the Board be payable in the form of grants to the various road authorities throughout the country. It must be understood that the Road Board is purely and simply an advisory body for road betterment, and its powers are limited. It has no power to compel a county or district authority to do anything: it can only give grants or withhold them, and it only gives grants when its recommendations are followed, and the work of road authorities approved; further, these grants are not for

road making but for road improvement and maintenance.

The Road Board has done a lot of good work more particularly in experimenting with tarred surfaces and re-laying of the upper crust, or repair with tarred macadam.

Difficulties Due to Commercial Car Traffic

Certain difficulties, however, have been found with the present arrangement caused more particularly by commercial car traffic. The Road Board grants are only subsidiary to the main cost of road repair, and that main cost has to be found by the local authorities out of the local rates. Now in a locality in which heavy and frequent bus services are running, the road wear has been quite abnormal. The roads very soon wear into a series of transverse corrugations at regular intervals of about 1 ft. or 2 ft., causing an extremely rough sort of vibration and very soon necessitating repair. The buses running along these roads pay their petrol tax, but it goes to the Road Board building, which distributes it over the country; the districts with the motor bus services do not receive Road Board assistance proportionate to the wear of their roads, and in 1912 a ruling went into effect that where it could be shown that individual services were doing damage to the road, arrangements should be made whereby the moneys paid to the Road Board on the gasoline for those services should be earmarked for the use of the districts which they effected.

Weight of Vehicles

Talking of heavy traffic, there is much talk at present among the County Councils Association of pressing Government for some modification of the weights of the heaviest vehicles. At present the maximum permissible weight of a car is 5 tons empty and the registered axle weight when loaded must not exceed 8 tons (British ton equals 2240 lbs.), while the total registered axle weight of the car loaded must not exceed 12 tons. If a car runs on rubber tyres it may run at 12 m.p.h., provided no loaded axle weight exceeds 6 tons; but axle weights over this figure must keep to a maximum of 8 m.p.h. With steel or iron tyres above 3 tons unladen, no matter what the axle weight, 5 m.p.h. is the limit, between 2 and 3 tons 8 m.p.h.

These weights assume certain relative measurements of widths and diameter of tyres, but in any case the steel tyre must not be less than 5 in. wide. For wheels

3 ft. in diameter the tyre has to be as many half inches wide as there are units of $7\frac{1}{2}$ cwt. in the axle weight, of the axle to which the wheel belongs. If the wheel exceeds 3 ft. in diameter a similar formula applies, but the unit shall equal $7\frac{1}{2}$ cwt. plus an addition in the proportional of 1 cwt. for every 12 in. increase of wheel diameter. Finally, if the wheel is less than 3 ft. in diameter the unit shall be $7\frac{1}{2}$ cwt. minus a deduction in proportion of 1 cwt. for every 6 in. decrease of wheel diameter.

No restrictions are placed on the widths of rubber tyres as in their case self-interest prevents excessive over-tiring.

At present, commercial cars pay £1 (\$5) for registration, the same as a private car, and the driver has to pay 5s. (\$1.25) for a license, while passenger vehicles have to pay \$3.75 for a "hackney carriage license," and if they ply for hire, they have to pay for licenses from the municipalities in whose streets they work. For the rest, a car only pays to the roads on the petrol that it uses, and though this gives a result reasonably proportional to the amount of road wear that it causes, it is felt by some road engineers that the weight factor has been ignored and that further restrictions should be placed, not only on the weight pressure of tyres on the road, but on axle weights. Under the existing law the authorities have the right of taking any car of over 2 tons unladen weight to a weigh-bridge. Broadly speaking, it is fondly supposed by designers that the back wheels should carry two-thirds of the weight, but in many cases, especially with steamers, three-fourths of the weight has been found to rest on the back axle. It is possible that in the future we may see some further restriction placed upon axle weight limits, and for cars working on normal road gradients and surfaces, and without undue trailer loads, such restrictions, if moderate, might prove no bad thing; for any influence tending to throw more weight to the front will also tend to do away with undue rear overhang—the most fruitful source of side-skid trouble.

At the present time a Local Government Board Committee is considering the advisability of modifying existing detail regulations, but it is unlikely that we shall see any drastic restrictions placed on motor traffic. It is a matter of adapting roads to the car rather than the reverse, and this is being done steadily. Good as the British roads are, most were not built for such heavy weights, and in some cases a good deal of graft has been mixed with the foundations, the result being that they have had to be little by little, reconstructed. Still, the latest methods of road building with tarred macadam and such like materials to meet the demands of motor traffic are working a steady improvement.

Hercules Buggy Company, Evansville, Ind., has begun manufacturing bodies for small trucks. Over a hundred men have been added to the working force, and an addition to the factory will be erected in the fall.

Goodyear Tire & Rubber Company's Baltimore solid tire agency has been taken over by the Lord Baltimore Truck Company, Bank and 5th Streets. Mr. E. C. Heid, for 3 years connected with the Goodyear Baltimore branch, has taken charge of the sale of these tires for the Lord Baltimore concern.

THE REFRIGERATOR AUTOMOBILE



WITH Italy joining in the madness of nations, a good deal of interest is being focussed on her military equipment. With her hot climate, and the prospect of a summer campaign, the transport of perishables is important.

At present she possesses 25 refrigerator automobile trucks, though she can do with 20 times this number. The Italian Government, however, has the matter well in hand, and is, we believe, negotiating with an American firm for a refrigerating plant which will render any new vehicles an advance on the existing trucks. At present army meat is carried in rather small isothermal refrigerator trucks, with ice as the cooling medium. The bodies of these cars were designed by Signor Bullo, Engineer of the Societa Italiana Ernesto Breda, near Milan. They can accommodate 12 quintals (2640 lbs.) of meat, for the carriage of which a movable tank of about 220 lbs. capacity for ice is provided, and air from the outside supplied by a fan is suitably cooled by the ice so that the temperature inside the car is maintained at the required point. The bodies of such cars have not only to be sufficiently large to carry the load, but their proper temperature insulation is of the utmost importance. Nothing has been omitted to make these cars answer requirements in this respect. The interior measurements of the body are 5 ft. 10 $\frac{1}{2}$ ins. long, 5 ft. 7 $\frac{3}{4}$ ins. wide, and 44 ft. 9 $\frac{1}{2}$ ins. in average height. The frames of these cars are in elm, with ceiling, walls and floors in double lined pine, the intermediate space being occupied by Expansit insulator in compressed grains. Further, the interior surface of the lining of ceiling and floor is covered with waterproof felt "Dumetect," and inside the flooring and walls to a height of 4 in. is lined with sheet zinc. The body is furnished with a two-leaved door, covered with compressed felt so as to close hermetically. This can be opened outwards. The frame of the door is in elm, and in its insulation arrangement it follows the rest of the body.

Inside, near the front, is the movable ice tank made of sheet iron and strengthened at the corners with iron elbows. This has double bottom, the first one in the form of a grill to facilitate the escape of water, which comes away through a double siphon tube. To facilitate the circulation of air in the path below the ice tank (which for the purpose is fitted with metallic network) a fan is placed in the ceiling. For loading the ice in the roof there is a man-hole with hinged door to open outwards, and when closed to seal hermetically like the other. The exterior of the roof is covered with a textile and wool rendered waterproof.

These bodies weight 1540 lbs. empty, 4180 lbs. with full load. The twenty-five refrigerator cars for army supplies are of three types—twenty-one called the U. I. B. type on 18 h.p., Isotta Fraschini chassis; two of the Lybia type on 20 h.p. F. I. A. T. chassis; and two of the Zanfuni type on 15 h.p. F. I. A. T. chassis.

THE LIMITATIONS AND POSSIBILITIES OF THE MUNICIPAL MOTOR—A CENSUS OF OPINION

Of late a good deal of attention has been paid to the possibilities of the motor for municipal engineers' work, especially at the recent meeting of the Institution of Municipal and County Engineers. On the whole, experience seems very much in favor of the motor, though in municipal work care must be taken to appreciate its limitations, which are well revealed in a sort of census taken by Mr. H. M. Hamblett, the Cleansing Superintendent of Salford, who sent out some thirty letters of inquiry to various municipal authorities all over Great Britain, from the north of Scotland to the south of England. The following questions were asked as to the value of motor traction as against horse traction with the following results:

	Favorable	Against	Undecided
For street cleansing work	6	11	6
For street watering work	13	12	6
For machine sweeping work	12	9	9
For domestic cleansing work	8	9	6
For clinker removal work	6	5	12

THE MAIL AUTOMOBILE MAKES HEADWAY IN BRITAIN

The report of the British Postmaster General for the year 1914 is now to hand, and shows that during the past 12 months no fewer than fifty new motor mail services have been established, bringing the total of motor mail lines in the United Kingdom to well over two hundred. For the most part large vans are used, but the possibility of the motor vehicle for final distribution is also being realized, and in many country districts, as the result of some months of experimenting, motor cycles with box side cars are now being permanently employed.

Edward Franzmeier, a farmer near St. Paul, Minn., milks twenty head of grade cows every day and hauls the milk to some retail grocers in St. Paul. He also raises vegetables and small grain. Last July Mr. Franzmeier bought a one-ton KisselKar truck to save time and wear and tear on his teams.

Before he bought his motor truck Franzmeier got up at midnight and left at 1 a.m., arriving at the St. Paul market at 4 or 4.30 a.m. Now he rises at 4 a.m., starts at 4.15, arriving at the market at 5. He says that when the market is good he is often home again at 7 a.m. ready for a day's work. By the old method he was away from home from midnight until noon and came back with a tired team and himself in no condition to do very much work that day.

Mr. Franzmeier does all of his farm hauling with the truck, such as hauling machinery or taking plows to the blacksmith, so that his horses are reserved for work in the fields.

Ferro Machine & Foundry Company, Cleveland, Ohio, has closed its Detroit office, and John J. Ramsey, resident manager, is now working out of Detroit, covering considerable territory, but spending most of his time in Detroit.

**Firestone
Pressed On Tires**

Unmatched Service!

Resiliency and Toughness, combined as only Firestone methods can combine them.

Firestone Construction, making an absolute unit of saw-tooth channel steel base, hard rubber sub-base and extra thick tread rubber.

The Results in Service have proven the superiority of these Firestone features.

A special Firestone compound is made for electric trucks.

There is a Firestone tire for every road, load and condition of service.

Call the Firestone Station nearest you for help in solving your service problems.

Firestone Tire & Rubber Co.
"America's Largest Exclusive Tire and Rim Makers"
AKRON, OHIO—Branches and Dealers Everywhere

THE MOTOR ROAD SWEEPER. HOW IT IS REDUCING WORKING COSTS IN ENGLAND, WITH SOME FIGURES



THE Marylebone Borough Council in London have for some time been contemplating the substitution of the horse by the motor sweeper. Accordingly, they appointed a Works Committee to go into the question. The committee obtained information from over forty other municipal authorities, about twenty of which had already adopted motor transport of various kinds.

Horse and Motor Sweeping Compared

The general consensus of opinion was that either steam or gasoline was undoubtedly superior to horse or manual labor, and that a motor sweeper could do from three to six times the work of a horse machine. For a horse machine, 13 miles constituted a day's work; the motor could cover from 68 to 90 miles traveling at an average of from 8 to 16 m.p.h.

This is how the committee figured out the proposition: The present night-sweeping gang consists of one foreman, four leading sweepers and thirty-two sweepers, and if motor sweepers were used the work could be done by one foreman and fifteen men, representing a saving of \$24.50 a night. The cost of horse hire under contract for sweeping machine brooms comes to \$3220 per annum, averaging per night \$8.75; cost of brooms, squeegees, etc., \$750 a year, \$2 a night; total, \$35.25 a night.

The cost of running the motor sweepers is given as \$16.96 a night, showing a total saving of \$18.29 in favor of the motor, which represents \$6655 a year.

The details of the figures are as follows:

Redemption of capital	\$1.79
Contract for maintenance for 10 years (\$65 each per annum)	1.75
Life of broom, 350 miles; cost 48s each, 1.64d per mile, 136 miles....	4.66
Two drivers at 6s per night	3.00
Gasoline, allowing 11 miles per gal, 12 gals. at 1s 1d (Westminster contract price, allowing half duty)....	3.25
Tires—cost £50 per set, guaranteed to run from 10,000 to 15,000 miles... Total cost per night	2.50 \$16.95

In these comparisons no account has been taken of the cost of boots and clothes to the men displaced, the payment of superannuation allowances, or the cost of repairs to machines and brooms.

\$3170 Saved in Seven Months by One Motor Machine

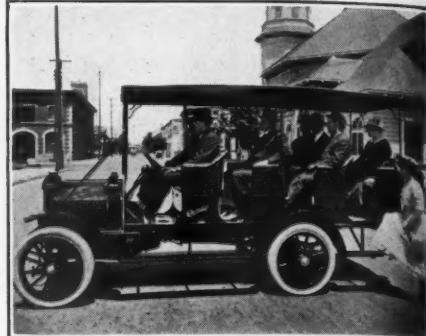
Finally, it is stated that although the above figures are only approximate, the committee believes them to be correct, and their opinion is borne out by a return issued by the Cleansing Superintendent at Blackpool, in which the working cost of a Laffly sweeper shows a saving of £634 in 7 months, although the machine has only been working half time. Birmingham also reports favorably on this machine.

Marylebone has 17 miles of streets paved with wood or asphalt which has to be washed and swept every night. To do this a machine must travel over the road eight times, so that at a speed of 8 m.p.h. two machines worked for 8 hours each will be sufficient. The possible hours of work are necessarily restricted, for all has to be done during night time when traffic is at its least.

The machine which the Marylebone Council propose to obtain as a result of their inquiry is a Laffly sweeper, which has a 12-15 h.p. four-cylinder gasoline engine, and is capable of a speed of 8 to 16 m.p.h., the brush rotating according to the road speed. A 100-gallon water tank is also carried and an automatic pump worked by a lever forces the water from this tank into an atomizer, which is connected to a large copper pipe running the length of the

broom, at a height of about 9 in. from the ground. Along this tube are several nozzles, each spraying two fine jets of water, which come down upon the road sufficiently forcibly to completely lay the dust. Then follows the broom, which, in the Laffly, has the peculiarity of adjusting itself to any unevenness of the road surface.

Incidentally, this machine has been found very effective for clearing snow.



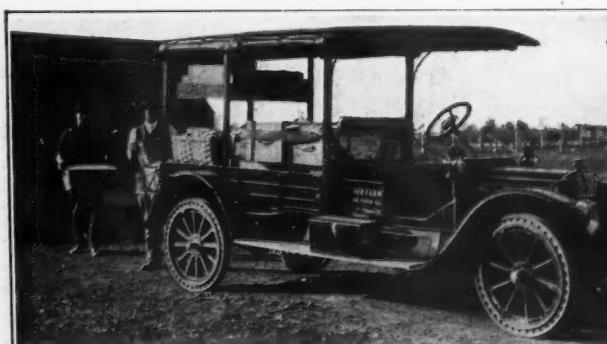
Short-Haul Passenger Service

This twelve-passenger bus, the "Commerce Express," which is operated twice daily between Los Angeles and San Fernando Valley, competing with the railroad, is showing a splendid profit to the owner. The fare is lower than the railroad fare and the service is said to be better.



Novel Truck Display, Showing Parts Used in Construction

The attached photograph shows a two-ton Mack truck, made by the International Motor Company, New York City, with the parts used in its construction mounted on an exhibition board. This is used by branch managers as a circulating display of the particular units of the truck's construction.



White Trucks Which Haul Farm Products and Groceries

The truck on the left—three-quarter ton capacity, is in service of A. E. Sharpley, of Melrose Park, Ill. The three-ton unit is owned by C. B. Witt, of Tampa, Fla.

The CCJ has most advertisers because it gives them biggest returns



White Building Makes White Truck Performance a Law Unto Itself in Length as in Perfection of Service

COMPARISONS may be "odious" but they eliminate the unfit. The comparative test of side-by-side service is the only fair way to find out which truck is doing the work steadiest, at lowest cost and for the longest time. Because of such tests White Trucks predominate in most large fleets in the country.

Faithfully, year in and year out, a White can be relied on to do your work at a big saving per ton mile. It keeps, practically, in constant commission, and operates with mechanical perfection which is almost a "thinking" intelligence.

And in a short time it pays for itself

with big dividend on the investment. And long after the time when, judged by ordinary standards, it would have ceased to exist on the company's books, the White keeps on going.

It stays on the job; it defies the junk pile; it knocks into a cocked hat all previous ideas of motor truck "depreciation."

Efficiency reasons dispose of the laggards in all departments of the world's work. They explain the striking preponderance of White Trucks. Ask any White owner; he has figured it out in dollars and cents.

We shall be glad to make suggestions on *your* trucking problem.

Exhibiting at the Transportation Building, Panama-Pacific International Exposition, San Francisco

THE WHITE COMPANY CLEVELAND

LARGEST MANUFACTURERS OF COMMERCIAL MOTOR VEHICLES IN AMERICA

New York - Broadway at Sixty-Second Street
Chicago - 2635-2645 Wabash Avenue
Philadelphia - 216-220 North Broad Street
Boston - 930 Commonwealth Avenue
San Francisco - Market St. and Van Ness Avenue
Baltimore - Mount Royal and Guilford Avenues

Pittsburgh - Craig Street and Baum Boulevard
Atlanta - 63-65 Ivy Street
St. Louis - 3422 Lindell Boulevard
Washington - 1233 20th Street N. W.
New Orleans - 750 St. Charles Avenue
Newark - 33-35 William Street

Seattle - - - - - 1514 Third Avenue
Memphis - - - - - 278-280 Monroe Avenue
Dallas - - - - - 2025-2027 Commerce Street
Toronto - - - - - 14 Alexander Street
Montreal - - - - - Forum Building
Winnipeg - - - - - 230 Fort Street

SCHOOLS OPERATE MOTOR 'BUS SYSTEMS FOR TRANSPORTING PUPILS

By C. L. EDHOLM

MOTORING to and from school by the omnibus line installed for their exclusive use, the California children enjoy an unusual advantage. The enterprising cities of Covina, Huntington Beach and Brawley have placed large passenger-carrying trucks in commission for this purpose and have found the results to be economical and satisfactory.

The first advantage is that by forming a large school district, covering a considerable area of prosperous ranching land, it is possible to build and maintain one large school with an excellent corps of teachers, instead of sprinkling picturesque but less effective "little red school houses" at intervals over the section. This means that the rancher's son and daughter may receive the thorough and modern instruction that would formerly have meant removal to some large city.

This involves cheap and rapid transportation, so that tax payers living at the farthest point may share equally with those near the school in the advantages. At Huntington Beach and Covina the electric trolley served the purpose for a while, the fare being paid by the public, but it was found that this was very expensive and not perfectly satisfactory, as it required quite a long walk to reach the car station in some instances.

The motor truck was finally selected as being ideal for the purpose, and years of actual test have demonstrated that the auto 'bus is more convenient and cheaper than the trolley.

The Covina Union High School and the Covina Grammar School are both served by a two-ton truck with a capacity of forty-five children. It travels about 60 miles every school day, making a 15-mile circuit four times, as the children not only go to and from school mornings and afternoons, but take a noon trip home for a substantial lunch. This in itself is a decided advantage.

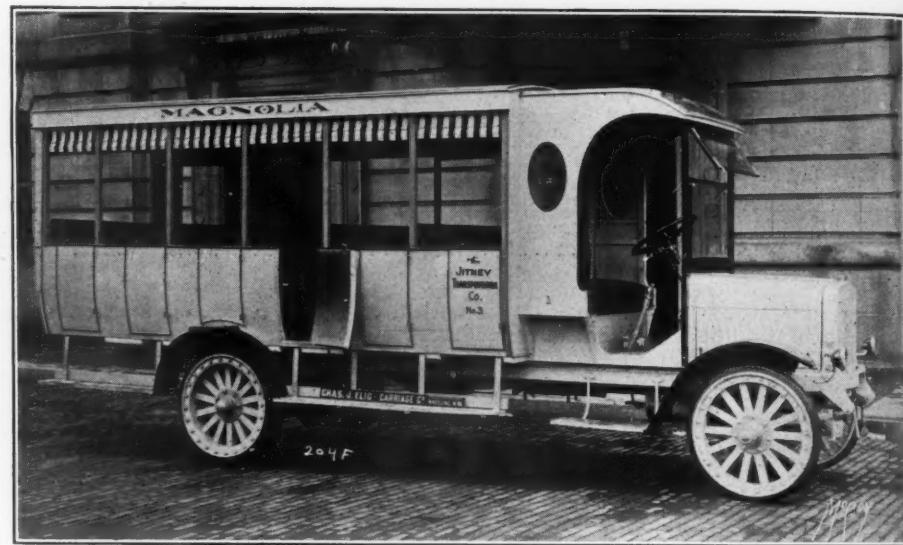
The truck is a California product, a Moore, built at the Torrance plant and was purchased at a cost of \$3000. In the first year, it is claimed that it paid two-thirds of its cost, saving \$2000 in trolley fares. Protection against sun and rain is provided by roof and curtains, and it is not only as easy riding as the trolley but has the accommodating habit of picking up passengers at their door. As the Southern California roads are excellent, the going is good in all weather.

At Brawley the truck is quite as important a factor in getting the children to and from school, as the trolley service has not entered that field. Touring cars were used at first, and proved so good, as far as their capacity admitted, that a motor 'bus was installed.

From Huntington Beach comes a complete statement by the principal of the Union High School, Mr. Arthur E. Paine, A.M., who tells of actual results in a convincing manner.

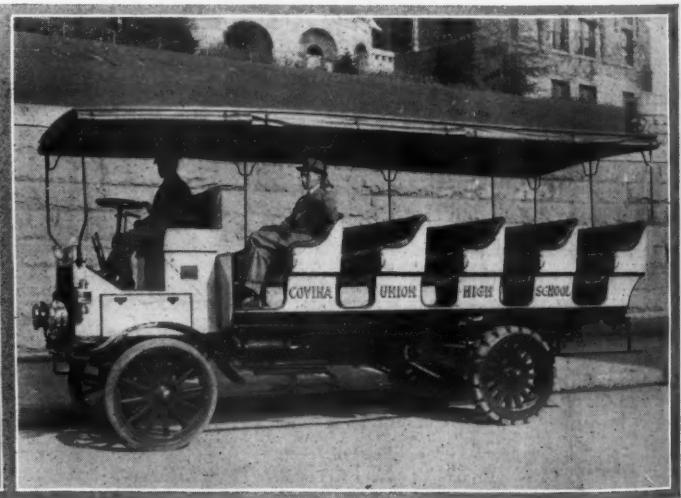
He says: "We have used our 'bus for nearly 2 years. When it started there was no good roads system but now it comes most of the way on County Boulevards. It was purchased at a cost of \$3000. It has cost considerable to run it and keep it in repair but it has paid for itself in that it has made it possible for children to attend high school who could not have done so otherwise.

"It has also paid for itself to our patrons because it has saved to many of them the cost of a private conveyance. It leaves Westminster, 7 miles north of the high school at 7.15 each morning, perhaps earlier in bad weather. About thirty-five pupils ride on this trip, as it stops to pick them up all the way in. The 'bus immediately proceeds to town, a mile and a quarter on to the southward, meets the electric trains coming from three directions, brings the pupils from these trains and those living in town, and gets back by 8.50. About the same number come from this direction."



A Worm-Drive Jitney

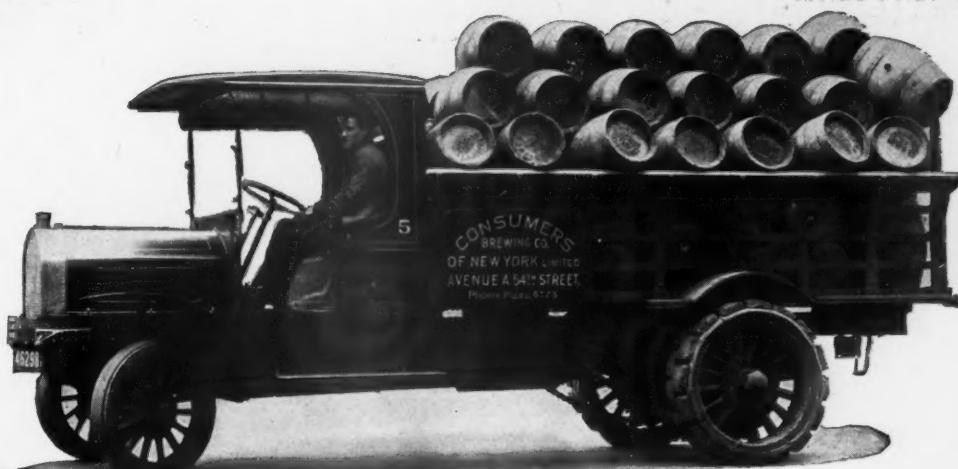
Made by Gramm-Bernstein Company, Lima, Ohio. It is the two-ton standard chassis with bus body, which has been sold to the Jitney Transportation Company, of Wheeling, W. Va.



Motor 'Buses for School Children

The view to the left shows the 'bus used at Huntington Beach, Cal., it being a Moore two-ton truck, the passengers facing each other.
The right view shows the 'bus used by the Covina, Cal., Union High School

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers



What the Consumers Brewing Company Does With

MACKS

Five Macks handling suburban deliveries for the Consumer's Brewing Co. Ltd., of New York have cut the cost of delivery in half.

Mack trucks have made good with brewers—who are big users of trucks—as they have made good in a hundred other lines of business.

Tie up with Mack economy and service. Ask us about our line of 1 to 7½ ton trucks and 5 to 15 ton tractor-trailers. Chain and Worm Drive.

INTERNATIONAL MOTOR COMPANY

WEST END AVENUE & 64TH STREET, NEW YORK

Sales and service representation in
principal localities.



Producing the most complete line of Worm-Driven Motor Trucks on the market With the World's Best Units

4 MODELS

$\frac{3}{4}$ Ton----- $1\frac{1}{2}$ Ton-----2 Ton-----3 Ton

Read these Brief Specifications:

There are no better units and they are incorporated in all Diamond T Models.

- Continental Motors
- Rayfield Carburetors
- Brown-Lipe Transmission
- Timken Front Axle
- Gemmer Steering Gears
- A. O. Smith Frames
- Bosch Ignition

- Spicer Universal Joints
- Brown-Lipe Clutch
- Timken Detroit Rear Axle
- Timken David Brown Worm Gear
- Mather Springs
- Schwarz Wheels

Every model a masterpiece and the line covers every motor delivery requirement from light delivery to heavy haulage.

Diamond T Motor Car Co., Chicago, Ills.



Model J-3 2-Ton Capacity

Dealers:

We have been producing and selling DIAMOND T
Motor Trucks for 5 years.

- there are hundreds giving satisfactory service right now.
- We are pioneers in the Worm Drive field.
- We have a most attractive proposition to offer *responsible dealers*.
- We are financially equipped to make good every promise.

If you are an aggressive business man,---if you are anxious to connect with a company that can offer you a future,---if you are keen to secure your share of the certain profits to be had,---we advise that you write us for our Dealers' proposition at once.

(New light model ready for delivery November 1st, 1915)

Diamond T Motor Car Co., Chicago, Ills.

An illustration of a large truck tire. Inside the dark tread, there is a detailed black and white drawing of a rural landscape. A road leads through fields towards a small town with houses and a church. Several trucks are shown on the road, some carrying logs. The words "McGRAW TIRE" are embossed along the top edge of the tire's tread.

THE WAY TO
ECONOMY
IS THROUGH
MC GRAW
TRUCK TIRES

**Guaranteed for
8000 Miles**

Contain 10% to 20% more rubber than others of same rated size.

The toughest and easiest-riding of all solid rubber tires.

Applied and removed by the ordinary tire press—and no more expensive than ordinary truck tires.

Write for our money-saving proposition.

THE McGRAW TIRE & RUBBER COMPANY
FACTORIES AND GENERAL OFFICES, EAST PALESTINE, OHIO

Branches and Agencies in the
Principal cities

Hundred of Applying Stations
Conveniently Located



Six Cylinder—Worm Drive

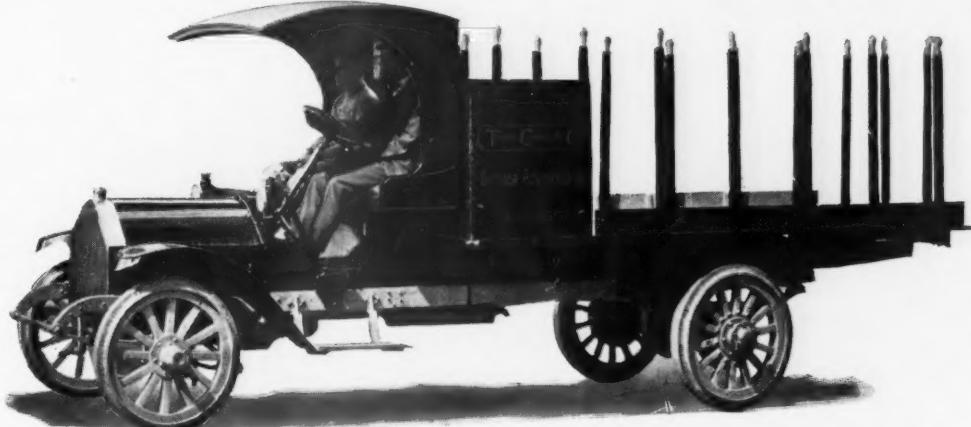
1½ Ton-\$1900 2½ Ton-\$2500 3½ Ton-\$3000 5 Ton-\$4200

Exclusive Features found on no other make of truck

The most mechanically advanced line of trucks produced

**Six-cylinder motors used on all heavy models.
New principle of pulling (not pushing) load
through springs.**

**CLUTCH AND SERVICE BRAKE PEDAL IN ONE.
Timken David Brown Worm Gear Axle.**

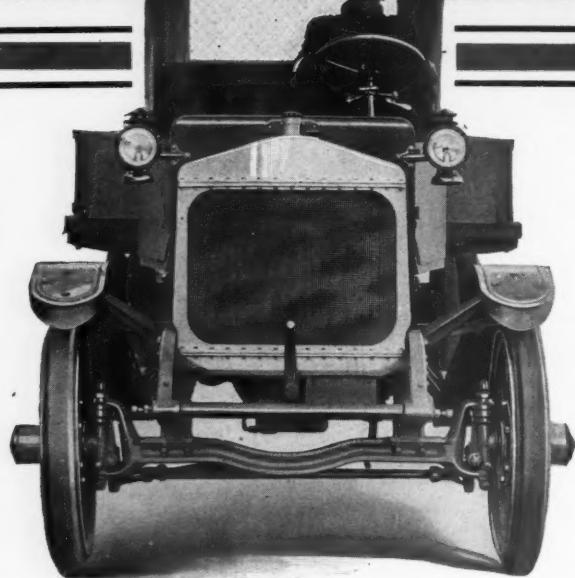
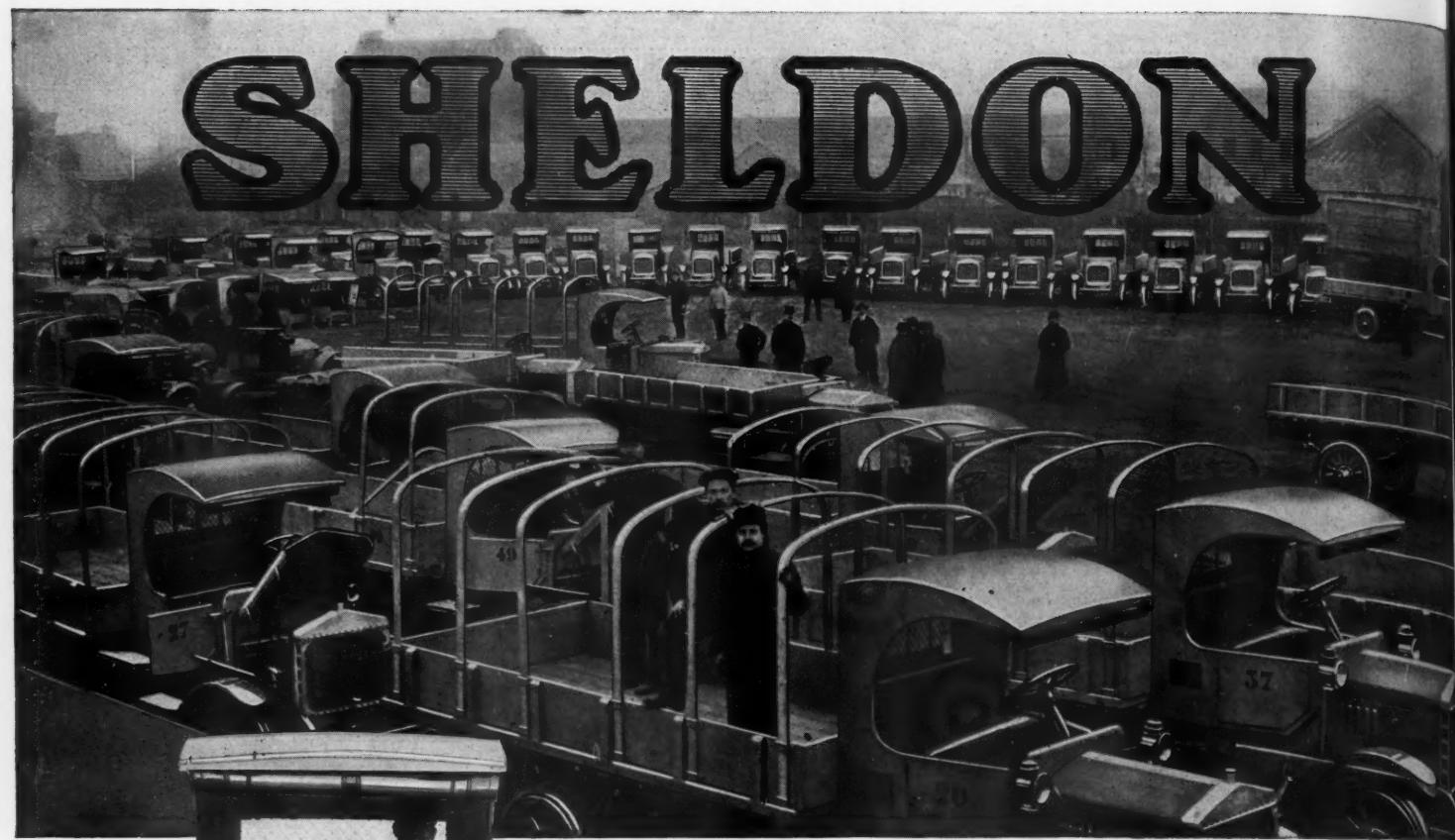


New Stegeman—1½ Ton Worm Drive

To Responsible Dealers: Here is your opportunity to successfully compete with any and all makes of motor trucks and to build up a lasting, profitable and highly satisfactory business in your territory. Stegeman trucks appeal quickly to the buyer who seeks quality and stability for motor haulage equipment. We seek the type of dealer who can handle that class of trade. If **you** are that dealer lose no time in writing us for full data, specifications, terms, etc. Territory being closed in the order of applications received. Get busy today.

Stegeman Motor Car Company
Milwaukee, Wisconsin

When Writing, Please Say—"Saw Your Ad. in the CCJ"



Herewith is shown a fleet of Sheldon-equipped trucks in France.

They are the product of the Sterling Motor Truck Company of Milwaukee, Wisconsin, who use Sheldon Worm Gear Rear Axles as well as Sheldon special truck front axles.

On the opposite page is an illustration of the 3-ton capacity (W. 30) worm gear axles used in these Sterling trucks.

It is interesting to note that but a small percentage of the remarkable increase in the output of Sheldon Worm Gear Axles is due directly to the influx of export orders that have been placed in this country during the past few months.

THE SHELDON AXLE A WILKES-BARRE

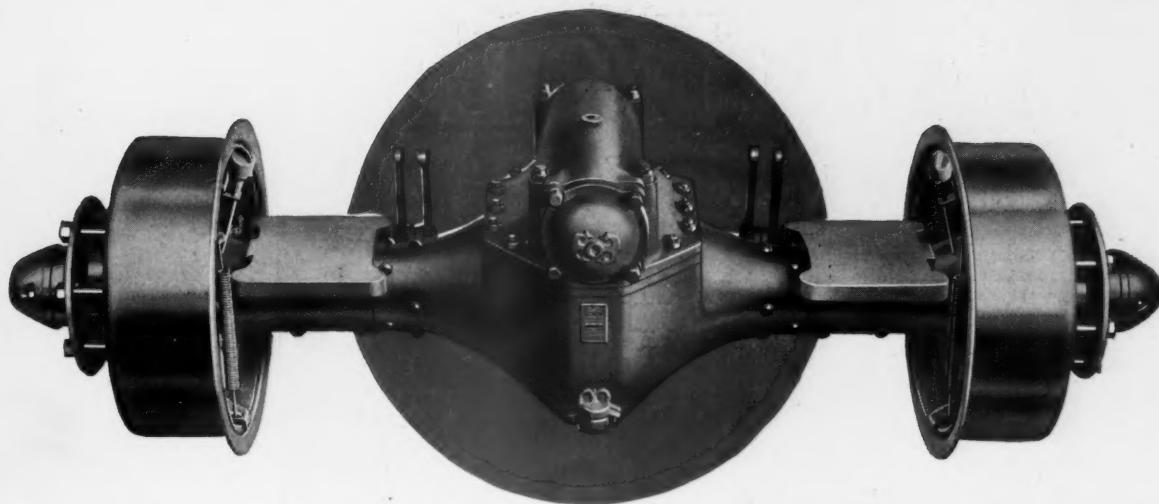
Makers of Springs and Axles for Heavy

Chicago:
122 S. Michigan Blvd.

"Exhibiting Section 16, Transportation Bldg.,

When Writing, Please Say—"Saw Your Ad. in the CCJ"

Worm Gear Axles



This increase in the first place is due rather to the rapidly growing conviction on the part both of truck makers and users that any type of drive other than worm gear is an actual compromise of efficiency—and in the second place to the realization that Sheldon design represents unquestionably the most nearly perfect application of this superior type of drive.

Worm gear as a type is now known to be the superior method of power transmission.

The use of ball bearings to carry both radial and thrust worm loads, and the use of the semi-floating type of axle in which to incorporate this ball bearing mounted worm have been established firmly as the superior methods in which to make use of the worm drive principle. It is no surprise therefore, as the truth of these facts has become known generally, that Sheldon, as the original exponents of these principles should reap the reward of their foresight and progressiveness in the realization of a wonderful sales increase that has taxed our production capacity to maintain shipping schedules.

Anent this question of production we wish to assure our customers that as rapidly as new machinery and equipment can be bought and installed we are increasing our already enormous manufacturing facilities, that in the future as in the past we may be able to maintain our reputation for promptness of delivery as well as quality of production.

A ND SPRING COMPANY

Duty Service for More than 50 Years

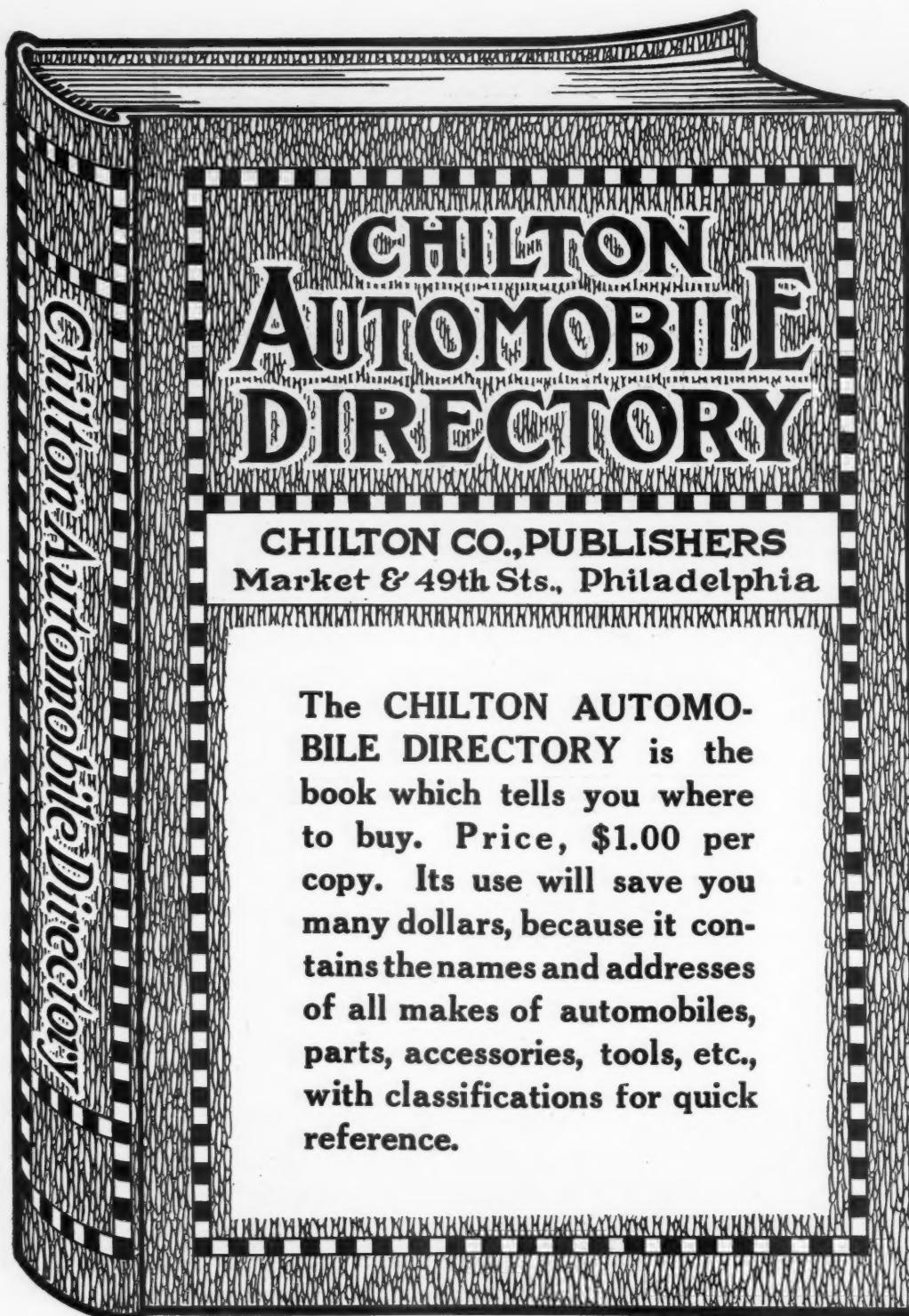
Detroit:
1215 Woodward Ave.

San Francisco:
444 Market St.

Panama-Pacific Exposition, San Francisco."

PENNSYLVANIA

When Writing, Please Say—"Saw Your Ad. in the CCJ"



The CHILTON AUTOMOBILE DIRECTORY is the book which tells you where to buy. Price, \$1.00 per copy. Its use will save you many dollars, because it contains the names and addresses of all makes of automobiles, parts, accessories, tools, etc., with classifications for quick reference.

In the course of a year you buy many miscellaneous supplies for your business. Even though you may get most of these through a source which is satisfactory to you, undoubtedly you spend a great deal of time trying to find the names and addresses of makers of various products, either for the purpose of improving on what you have, or obtaining better prices.

Where do you get these names and addresses? If you are up to date, you use the CHILTON AUTOMOBILE DIRECTORY, which is issued quarterly—January, April, July and October. There is no other publication in the United States which accurately gives you, under the proper classification, the names of manufacturers of all products which enter into the manufacture and sale of automobiles, including all sorts of accessories for the car, the garage and the shop.

Not only is the buying-right feature of untold value to you, but if you are informed, you can buy what your customers want at prices which are satisfactory and from sources which are convenient. Merely by referring to a book which contains accurate classifications of everything you ought to have, you are able to make your purchases judiciously, and this will add very materially to your success in business. This valuable knowledge is yours for \$1.00, so why not place your order for a copy of the July DIRECTORY, which is now ready for distribution?

WHERE
do you
buy the
things you
sell?

Do you confine your purchases to a few, or do you learn the names of the makers of the various products you require, so as to be able to purchase first-hand to the best advantage?

TORBENSEN

INTERNAL GEAR DRIVE AXLES

The Ideal Axles for Heavy-Duty Trucks

In the construction of trucks for heavy-duty service there are five qualities that must be obtained from the rear axles in order to achieve the best results.

These are strength, low gear ratio, simplicity, quietness of operation and efficiency. Each of these qualities is present in the TORBENSEN INTERNAL GEAR DRIVE AXLES to an extent that is not found in any other type.

Strength—a solid axle carries the load.

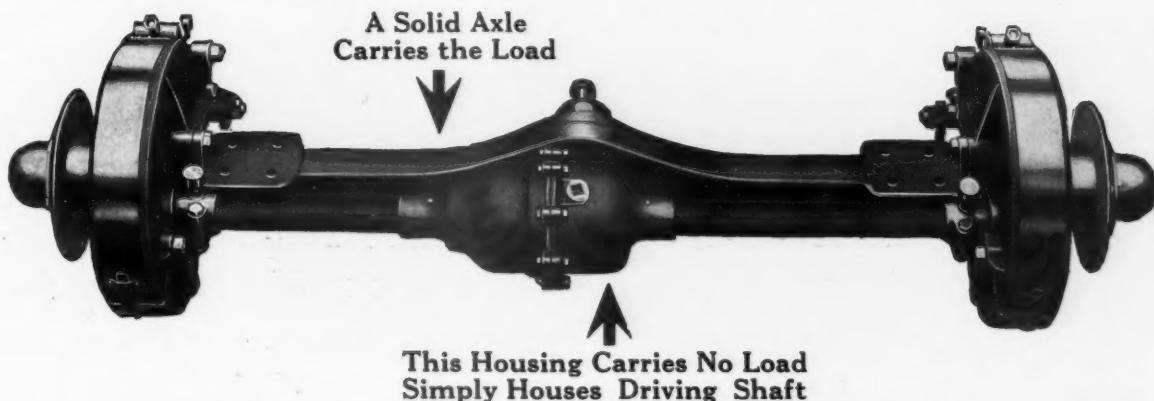
Low Gear Ratio—made possible by spur and internal gear directly in the wheels.

Simplicity—few parts required for spur and internal gear.

Quietness of Operation—properly meshed gears, enclosed, operating in lubricant.

Efficiency—that of well-cut spur gears.

This is the reason TORBENSEN AXLES have proved in service to be the ideal axles for heavy-duty trucks.



Torbensen Gear and Axle Company

E. 72nd St. and L. S. & M. S. R. R., CLEVELAND, OHIO

(Formerly Newark, N. J.)



WEST'S CAST-STEEL WHEELS



The price of experience is often high. You can save yourself unnecessary cost in the selection of the right wheels for heavy-duty trucks by profiting by the experience of others who have blazed the way with experiments.

Both in Europe and in this country the experience of these pioneers has proven that good steel wheels are vastly superior to those made of wood, for heavy-duty trucks.

You can profit further by our five years' experience in the production of steel wheels, and secure those which are known to be the greatest service givers. Over 9000 in use tells the story of their supremacy in this country.

We'll be glad to tell you in detail why *West's Cast-Steel Wheels* are best for your heavy-duty trucks.

The West Steel Casting Company, Cleveland, Ohio



For 1916—3 Models

3/4 Ton

\$995.00

(With Standard
Express Body)

2 Tons

\$1575.00

(Chassis)

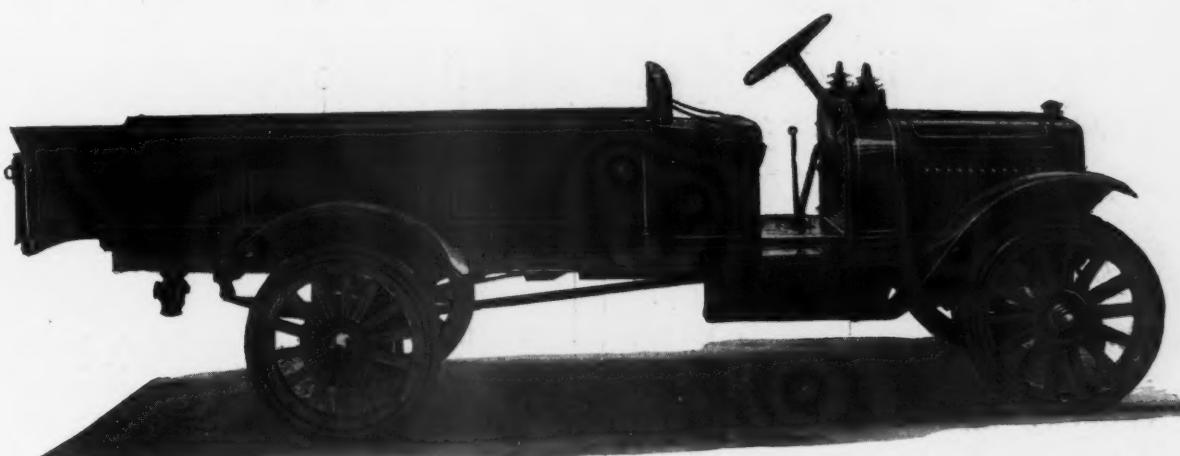
3-3½ Tons

\$2250.00

(Chassis)

**The Most Complete Line of Dependable Motor Trucks
Covering Every Delivery and Haulage Requirement**

It is because our business warrants and necessitates building in quantities that we are able to give the greatest truck values and set new standards of prices and quality in the commercial car field.



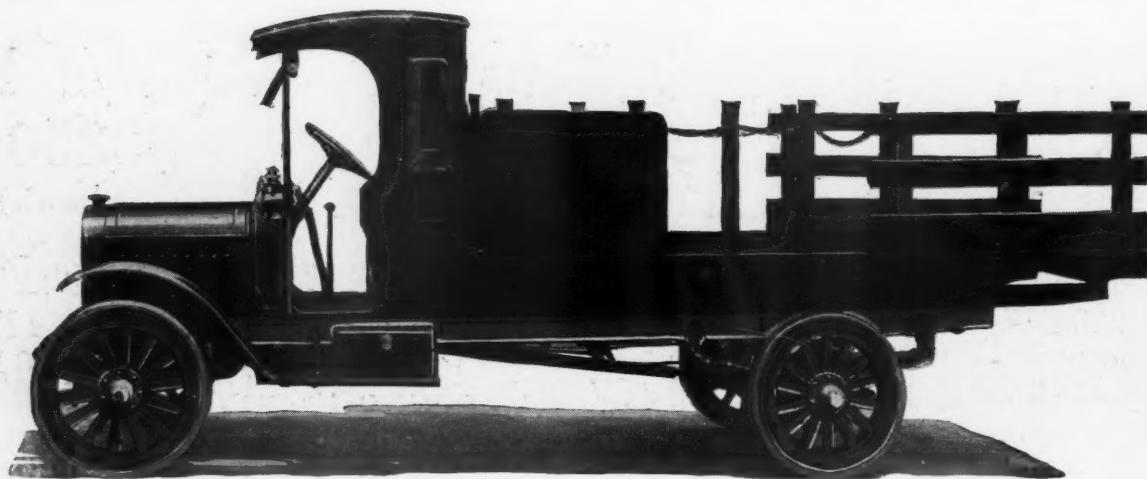
Model F, 3/4 Ton—\$995.00 Complete, With Express Body

"The Honest Truck at an Honest Price"

Republic Motor Truck Company, Alma, Mich.



The 2 Ton Model "A", Price \$1575.00 (Chassis)



The Honest Truck at an Honest Price

The fastest selling Truck in America

The Republic dealer can look the prospective buyer straight in the eye and truthfully say:

"I am offering you absolutely the greatest value obtainable—a truck honestly built and honestly priced—for every dollar you pay, value received is represented in the Republic truck."

The success of the Republic Motor Truck Company has been made possible by carrying out the fixed policy to build a truck of unusual capacity and quality and to price it at a figure that makes the REPUBLIC not an expense but a paying investment.

Special Features, Model "A", 2 Ton

Motor, 3 $\frac{3}{4}$ " x 5"; Wheel Base, 144"; 3 Speed Transmission; 35" x 6" Rear Tires; 32" long x 3" wide Rear Springs, Alloy Steel; 5 $\frac{3}{4}$ " Deep Pressed-Steel Frame. High-Tension Magneto; Stromberg Carburetor; Automatic Governor. Internal-Gear Drive.



The 3-3½ Ton Model "E", Price \$2250.00 (Chassis)



The Honest Truck at an Honest Price

The fastest selling Truck in America

Don't let Mr. Opportunity walk by your door unnoticed—go out and grab him by the hand.

If you are a **business man**, get into the Republic truck business—get into it **NOW** and secure your share of the **certain profits**.

Don't spend your valuable time nursing **any** business that won't give you a fair living at the best—get into the truck business now with a successful company and make real money.

All Republic Dealers are money-makers—Why not you?

Special Features, Model "E", 3-3½ Ton

Motor, $4\frac{1}{4}'' \times 5\frac{1}{2}''$, Heavy-Duty Type; 4 Speed Transmission; Wheel Base, 165"; 37" x 5" Dual Rear Tires; 62" long x 4" wide Rear Springs, Alloy Steel; 7" deep Pressed-Steel Frame. High-Tension Magneto, Stromberg Carburetor, Steel Wheels. Internal-Gear Drive.

-and now, the Dealer Opportunity

Get in the Truck Business Right— Don't Be a Trailer

Handle a line that permits you to put in your efforts selling trucks and making money rather than apologizing and losing money.

The truck business is just coming into its own—if you make the proper connection **NOW** your success is assured.

TRUCK DEALERS!

Many aggressive business men who should become independent in a few years handling the Republic line have handicapped their future by an unwise selection. If you want a permanent business—become part of a permanent organization, built on a substantial foundation, that means permanency, viz: **The honest truck at an honest price.**

AUTOMOBILE DEALERS!

Your first consideration should be your own advancement—we urge that you consider carefully the future offered you by the Republic Agency as compared to some pleasure car agencies.

The demand is here—the Republic line fills every requirement—there is a model for every need.

Republic dealers are making money—we are glad to refer you to our present dealers and let you hear the story first hand.

We extend to you an invitation to join us—to "cash in" with us on our success.

We offer you the opportunity to be the most successful truck dealer in your territory.

Write to us today—**NOW**.

Better yet,—wire us,—we're alive if you are.

Republic Motor Truck Company, Alma, Mich.



Millions of tons of building materials, coal, ice, milk and other heavy products, have been delivered at an excessive cost because the KNOX Four-Wheel TRACTOR had not been invented.

Millions of tons were laboriously hauled by horses at the biggest overhead and then they were hauled on rubber tires at an almost equal expense. Now they are carried in inexpensive trailers equipped with steel tires and hauled by the powerful KNOX "Engines."

Here we have the locomotive of the road—the most powerful, economical and speedy traction device ever made. The price at which the KNOX hauls modern loads eclipses that old-time method as the modern railway "Mogul" eclipsed the ancient wood burners.

The KNOX TRACTOR has received an amount of engineering attention probably unequaled by that of any other motor vehicle. It has received an amount of experimental care which can be appreciated only by those who have been big manufacturers of automobiles. The tremendous facilities of the KNOX plant have been thrown wide open and have been solely devoted to the creation, evolution, development and manufacture of this much-needed road locomotive.

The result is a traction device which makes a material saving in the cost of transporting heavy loads anywhere in the world in competition with other road vehicles. The KNOX Four-Wheel TRACTOR sets an absolutely new record for large tonnage and for low ton-mile cost.

The KNOX man in any city is a much-needed individual, much sought after, and without exception, a much-respected, highly successful business man who owes his success to the fact that he is a benefactor to the man who has loads to haul.

KNOX MOTORS ASSOCIATES

SPRINGFIELD MASSACHUSETTS

BRANCH OFFICES:

New York, 1872 Broadway

Chicago, 1621 Michigan Ave.

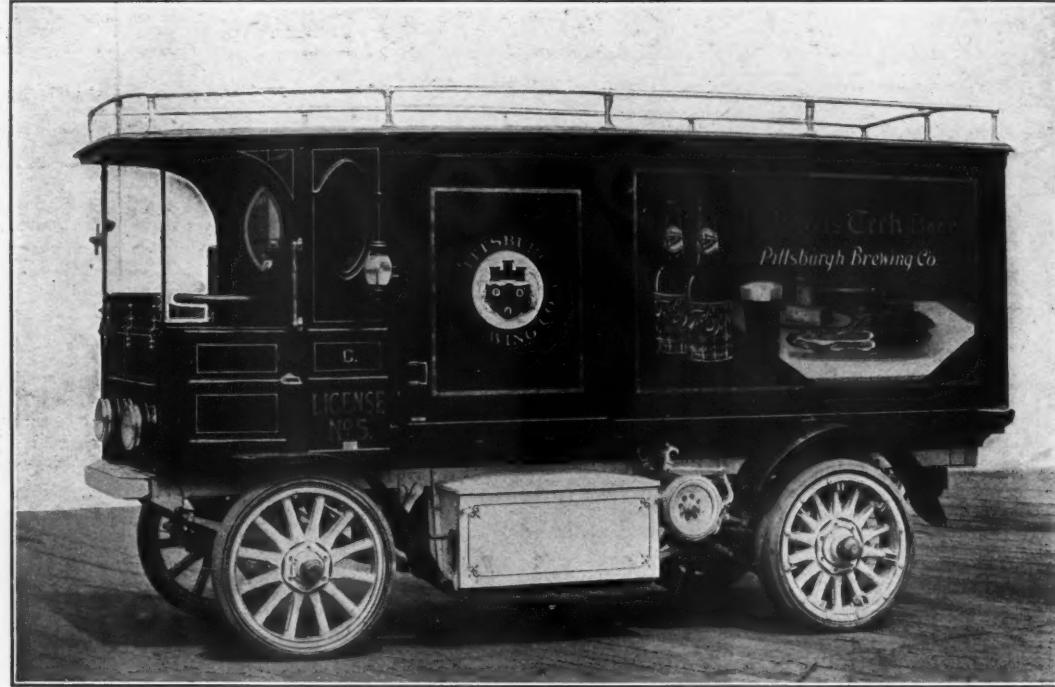
Boston, 825 Tremont Bldg.

Philadelphia, 604 Abbott Bldg.

Kansas City, 1735 McGee Street



When Writing, Please Say—"Saw Your Ad. in the CCJ"



A Two-Ton Electric Truck of the Pittsburgh Brewing Co. equipped with "Ironclad-Exide" Battery

A Very Interesting Letter from Pittsburgh about an "Ironclad-Exide" Battery

PITTSBURGH BREWING COMPANY
General Offices
HENRY W. OLIVER BUILDING
Iron City Brewery

Pittsburgh, Pa., May 12th, 1915.
The Electric Storage Battery Co.,
Pittsburgh, Pa.

Gentlemen:—With reference to your recent letter relative to the service that we have obtained from our "Ironclad-Exide" Battery in our 2-ton electric truck, we are pleased to give you our experience.

As you know, we tried other types of batteries and they were very unsatisfactory. The results that we have obtained, however, with the Ironclad Battery have been so very pleasing that we have decided to purchase additional electric trucks and will specify the Ironclad Battery for them all. We expect to use this type of battery exclusively.

We have had so little trouble with this battery that it has entirely changed our opinion of the electric truck. With the other types of batteries we were discouraged, but now we intend to proceed as indicated above.

Very truly yours,
IRON CITY BREWERY,
(Signed) E. J. Vilsack, Supt.

"Ironclad-Exide"—the business battery for business men

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

The "Chloride Accumulator", The "Tudor Accumulator",
The "Exide", "Hycap-Exide", "Thin-Exide" and "Ironclad-Exide" Batteries
Boston Atlanta Rochester Cleveland PHILADELPHIA, PA. Chicago Denver San Francisco
New York Washington Pittsburgh Detroit 1888-1915 St. Louis Los Angeles Toronto

AUGUST 15, 1915

THE COMMERCIAL CAR JOURNAL

63

J-M AUTOMOBILE ACCESSORIES

*One Firm One Service
One Guarantee*

**What Good is your
Brake if you have
not the Right
Brake Lining?**

When you buy your brake lining, choose it with great care. For no matter how efficient your brake mechanism may be, the question of safety is settled finally by the brake lining. It is this, and not the brake itself, that really stops the truck.

The right brake lining
for your truck and
for any truck,
is genuine.

**J-M NON-BURN
BRAKE LINING**

Because
J-M Non-
Burn has been
proved absolutely
dependable, not only in
motor truck service, but in
service on heavy industrial machinery
where the demands are infinitely more
severe.

J-M Non-Burn will "hold" on the steepest hill and bring your truck to a quick stop when disaster is imminent. You can rely on it implicitly at every stage of its service. Ask yourself, "Can I afford to entrust human lives and valuable property to any brake lining less efficient?" Write today for booklet.

3219



**COVERS
THE CONTINENT**

There is a distinct advantage in choosing from a line of automobile accessories on which the responsibility for service and satisfaction is concentrated in one organization national in scope and reputation.

For in this way the purchaser is assured of better service, better value and greater satisfaction all around; consequently the best return on his purchase. The car owner who buys J-M Accessories enjoys this advantage in the fullest sense.

Carter Carburetor Multiple-Jet

Makes motors more efficient. Saves fuel, gives greater power and insures perfect flexibility. Allows you to throttle down to 4 miles and jump to 40 without change of gears.



J-M (Mezger) Soot-Proof Spark Plug

Means sure-shot ignition. It is soot-proof, holds compression, and is built for lasting service. Price, 75 cents.



J-M Auto Clock

Keeps excellent time. Runs 8 days without rewinding. Setting and winding keys concealed. Finished to match fittings of car. Two mountings, flush or dash, each \$5.



*back of every J-M
Automobile Accessory*

LONG HORN



Model "J"

Do Cheaper Horns Really Pay?

You get just what you pay for when you buy a cheap horn—cheap materials, cheap workmanship and a cheap design. Horn value is more than paint-deep. Know something about what goes into a horn before you buy it.

Ask a Long Horn dealer to show you a Long Horn disassembled.

See how perfectly toothed and cut each gear is. And they are hardened machine-cut, steel gears and not cheap castings. The vibrator runs on a ball bearing, the diaphragm is made of the best Swedish steel, every part is chosen to give lasting service.

We might have said **everlasting service**, for a Model "J" Long Horn is built so well that it lasts indefinitely and is guaranteed permanently against defects in material.

If any part of a Model "J" Long Horn ever fails, bring back the horn and we'll give you a new one. That's our guarantee for the Model "J" Long Horn user's satisfaction.

Booklet on request

3245

H-W. JOHNS - MANVILLE CO.

Akron
Albany
Atlanta
Baltimore
Birmingham

Boston
Buffalo
Chicago
Cincinnati
Cleveland

Columbus
Dallas
Dayton
Denver
Detroit

Duluth
Galveston
Houghton
Houston
Indianapolis

Kansas City
Los Angeles
Louisville
Memphis
Milwaukee

Minneapolis
Newark
New Orleans
New York
Omaha

Philadelphia
Pittsburgh
Portland
Rochester
St. Louis

St. Paul
Salt Lake City
San Francisco
Seattle
Syracuse

Toledo
Washington
Wilkes-Barre
Youngstown

THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED

Toronto
Montreal
Winnipeg

Vancouver

When Writing, Please Say—"Saw Your Ad. in the CCJ"

A Business Car With a Businesslike Appearance and a Good Business Record

*You know it
by the shape
of the hood*



You See It Everywhere — Working Every Day

It is not in the garage for repairs, but is giving the owner continual service. Its economy of operation is well known and is unequalled. The truck is built for service and gives it, as every Lippard-Stewart owner knows.

Mr. Business Man,— you can not afford to do without it.

**Over 100 Different Kinds of Business Served
Over 40 Users Have Sent Repeat Orders**

Lippard-Stewart is the only worm-drive truck made in capacities from 1000 lbs. to 2 tons. Our $\frac{1}{2}$ -Ton Delivery Car was the first light car built like a truck, for service, with special frames and spring suspension; Timken axles and bearings and **Electric Starting and Lighting System**. Lippard-Stewarts are not built to meet a price, but to meet the requirements of a business and to do continuous hard service year after year.

**Capacities, $\frac{1}{2}$ Ton, $\frac{3}{4}$ Ton, 1 Ton, $1\frac{1}{2}$ Tons, 2 Tons
Two Delivery Car Sizes Three Sizes for Heavy Haulage**

Let us give you information before you buy any Delivery Car or Truck. We will help you analyze your problem and determine the type and size of truck which will prove most satisfactory in your service.



**LIPPARD-STEWART MOTOR CAR CO.
237 W. Utica Street, Buffalo, N. Y.**

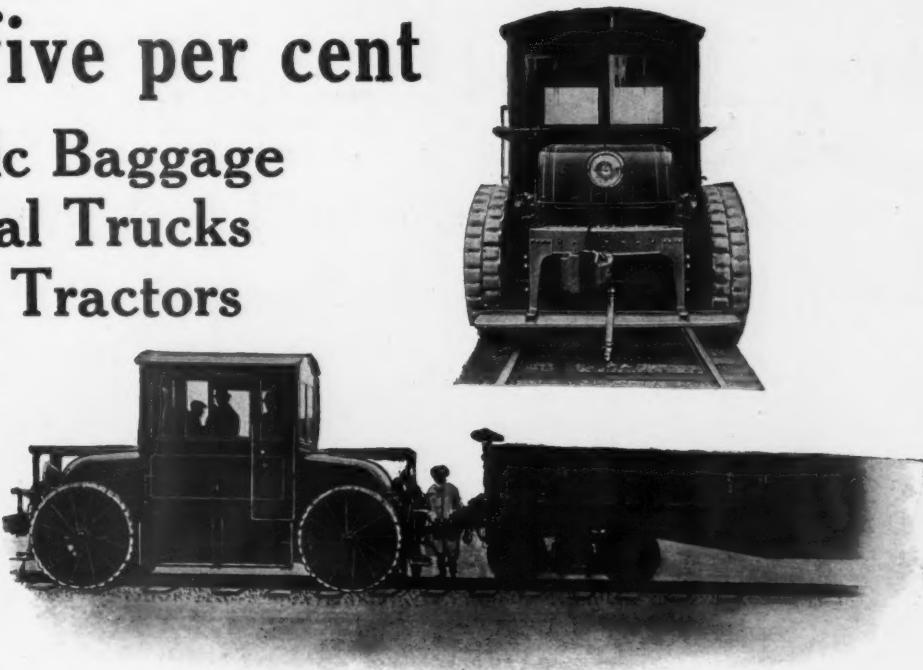
Chicago—Ropp Motor Co.
Lewiston, Me.—Wade & Dunton Carriage Co.
Pittsburgh—Vulcan Motor Truck & Service Co.
Cleveland—Albaugh Motor Sales Co.

Springfield, Mass.—Baxter & Duckworth Co.
Boston (Cambridge)—A. W. Cox & Co.
Richmond, Va.—T. D. Raney
Racine, Wis.—W. R. Taylor Motor Co.

Seventy-five per cent of all Electric Baggage and Industrial Trucks and Electric Tractors

are equipped
with

**Edison
Batteries**



Only six years on the market and yet in this brief period the Edison Alkaline Storage Battery has established its superiority as a reservoir for electric light and power.

One hundred railroads have adopted Edison Batteries for Train Lighting or Signaling or both—a large number buy it exclusively.

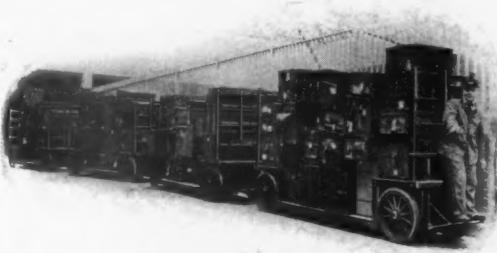
Large steamship companies have adopted the Edison Battery as an emergency source of power for radio apparatus and emergency lighting. Its application to emergency lighting on ferryboats at railroad terminals is recommended.

More than one-third of all Electric Trucks and Delivery Wagons are equipped with Edison Batteries.

THE EDISON STORAGE BATTERY

has a sturdy steel structure, alkaline electrolyte and non-deteriorating, active materials. Its remarkable ruggedness, long life, dependability and low maintenance cost result from its strong mechanical construction and unique electrical characteristics.

The Edison Alkaline Storage Battery has already been awarded two gold medals at the Panama-Pacific International Exposition.



Visit Block 12, Palace of Transportation, and Block 21, Palace of Machinery. Our representatives are at your service.

It is claimed by the users to be the most economical and satisfactory equipment

Edison Storage Battery Company Factory and Main Office, Orange, N. J.

DISTRIBUTORS IN

New York
San Francisco

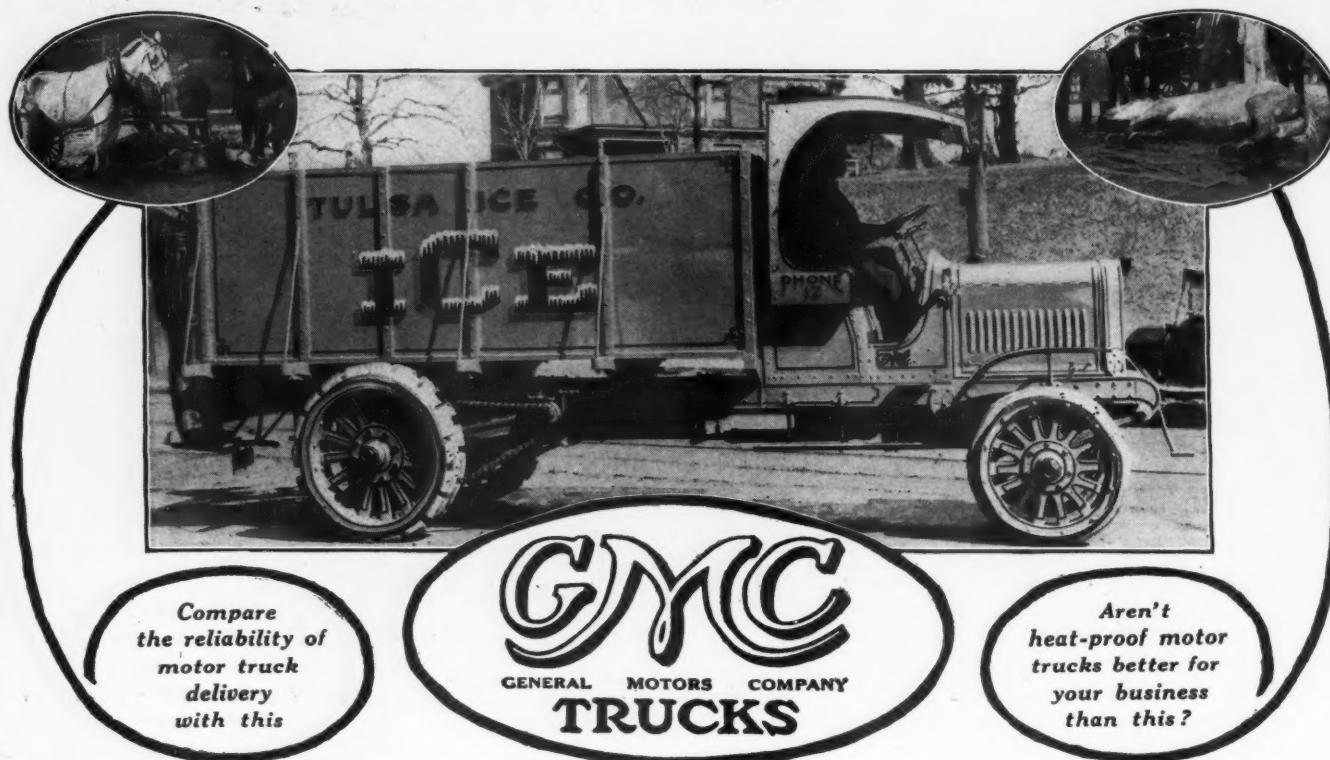
Boston

Chicago
Los Angeles

Detroit
Portland, Ore.

Washington
Seattle

Motor Trucks Guarantee Hot Weather Deliveries



Today business houses cannot give heat as an excuse for late delivery. Competition will not permit it! The horse must be supplanted by the motor truck if your business is to grow. Compare horse service with GMC motor truck service. Compare the reliability and heat-proof qualities of the gasoline or electric machine against the uncertainties of animal drawn equipment. Your duty to your business is to know motor trucks. Investigate now!

General Motors Truck Company builds top quality trucks to meet the demands of every business that hauls goods. Its line is the most comprehensive on the market. GMC Trucks are made in both gasoline and electric powers and in standard capacities that range from 1000 lbs. to six tons. Gasoline models in both worm and chain drive.

Ask for GMC facts and figures now, because it's today that you need a truck!

GENERAL MOTORS TRUCK COMPANY

One of the Units of General Motors Company

Pontiac

Michigan

New York

Boston

Direct Factory Branches:

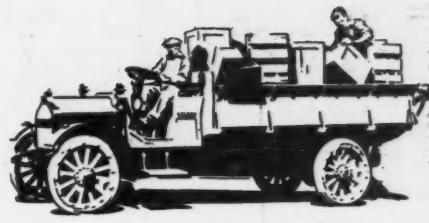
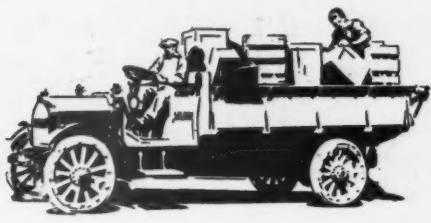
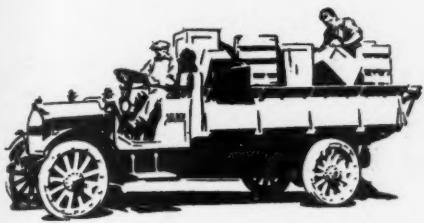
Chicago

Philadelphia

St. Louis

Kansas City

(20)



WHEN users voluntarily write us that their

Selden Trucks

have effected a saving of thousands of dollars in their carting account in four months—that the cost of upkeep has been small beyond their fondest expectations—that after a year of hard service their Selden is in such fine condition that it would be time wasted to overhaul it—that they are handling increased business and making quicker deliveries—that they greatly appreciate the prompt and efficient manner in which our service department came to their assistance in a time of need—we think it is convincing evidence that the Selden account is a desirable account for a dealer to have.

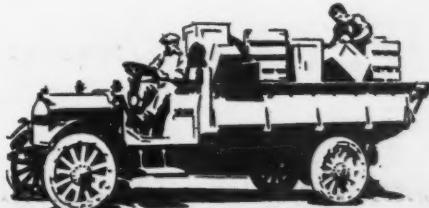
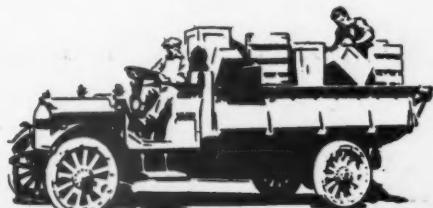
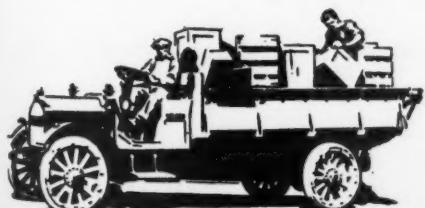
It is the satisfactory service the truck renders the purchaser that builds business for the dealer.

WORM DRIVE
2 ton \$2250

CHAIN DRIVE
1½ ton \$2000

If Selden Trucks are not being sold in your city, write to us at once about handling the territory.

Selden Truck Sales Co.
Rochester, N. Y.



Experienced Automobile Advertisers Know That Chilton Automobile Trade Service is Efficient and Economical

(But 28 issues a year to thoroughly cover the whole field)

It is economical because it renders the greatest service at the least cost, and it's efficient because it blankets the Automobile Industry.

The Service includes a full page for a year in the three Chilton publications, each covering a separate phase of the trade, and the free use of the Chilton Trade List.

Automobile Trade Commercial Car Journal Journal

(Monthly)

The Largest Automobile Journal in the world. Circulates chiefly among makers and dealers.
Carries the most advertising in its field.

(Monthly)

The leading Journal devoted to the subject of motor trucks.
Carries the most advertising in its field.

Chilton Automobile Directory

(Quarterly)

The recognized reference book of the industry.

Chilton Trade List

(Three times a year)

By far the largest and best list of dealers, etc., available.

CHILTON COMPANY, Publishers Market & 49th Sts., Philadelphia, Pa.

(Chilton Journals are Members of the Audit Bureau of Circulations)

1915





Announcing the new *Commerce* 1500 Pound Truck

For five years this company has been engaged in the production of commercial vehicles that are unrivaled in their particular field. During that time thousands of COMMERCE trucks have been placed in service and are today giving unqualified satisfaction. They have earned a reputation for quality and efficiency second to none.

Throughout this period we have made a careful study of delivery conditions and the best way to meet them. We have noted the growing demand for a highly efficient $\frac{3}{4}$ ton job that would sell for less than \$1000 and bent our energies to the production of a truck that will be

the greatest 1500 pound model ever offered at the price

In this we have succeeded. It is now ready. It is a distinctive truck,—better than any you ever saw at the money. It is a vehicle that will have a tremendous sale, because it is built to serve at a cost that assures profit,—because it is an unprecedented value,—because its price brings it within the reach of every merchant.

The new COMMERCE truck is here. Read about it and then write us for the detailed reasons why we believe it is head and shoulders above all others of its capacity and price.

SUGGESTION TO DEALERS

After reading the foregoing, I am convinced that many of you might decide that the above statements are of the usual type made by many manufacturers and I suggest that you write at once to several of the Commerce dealers who have been handling our truck during the past years,—who have built up for themselves, as a consequence, an established and profitable business in their respective sections.

H. G. Pendell, 1237 S. Figueroa St.
Los Angeles, Cal.
E. E. Moser & Co., 2026 Farnum St., Omaha
W. E. "Carload" Kenyon, 1714 Mich. Ave., Chicago
Sauers Motor Truck Agency, 60 Taylor St.
Springfield, Mass.
Peter M. Andriot & Sons, Louisville, Ky.

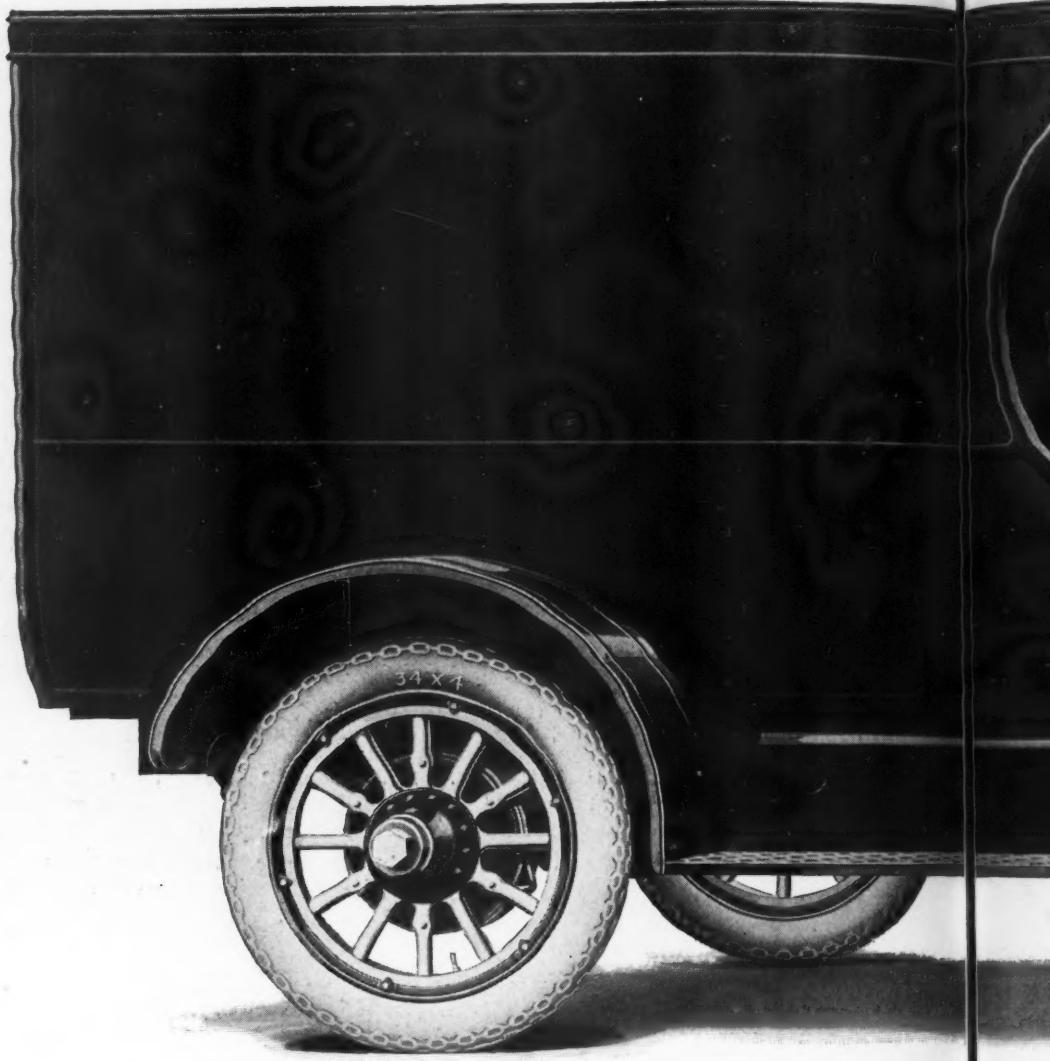
Kiel & Evans Co., 4th and Franklin Sts.
Oakland, Cal.
Allan Baker, 1215 Chestnut St., St. Louis
Thompson Auto Co., Detroit, Mich.
Commerce Truck Sales Co., Craig and
Forbes Sts., Pittsburgh, Pa.
Heilman Motor Car Co., Cincinnati, Ohio

You know these men. Each one is a leader in his territory. Write them today for the facts regarding the desirability of the COMMERCE agency. On their response direct to you, we rest our case.

W. C. Parker
PRESIDENT

Commerce Motor Car Company
Detroit, Mich., U.S.A.

This is the 1916



Model

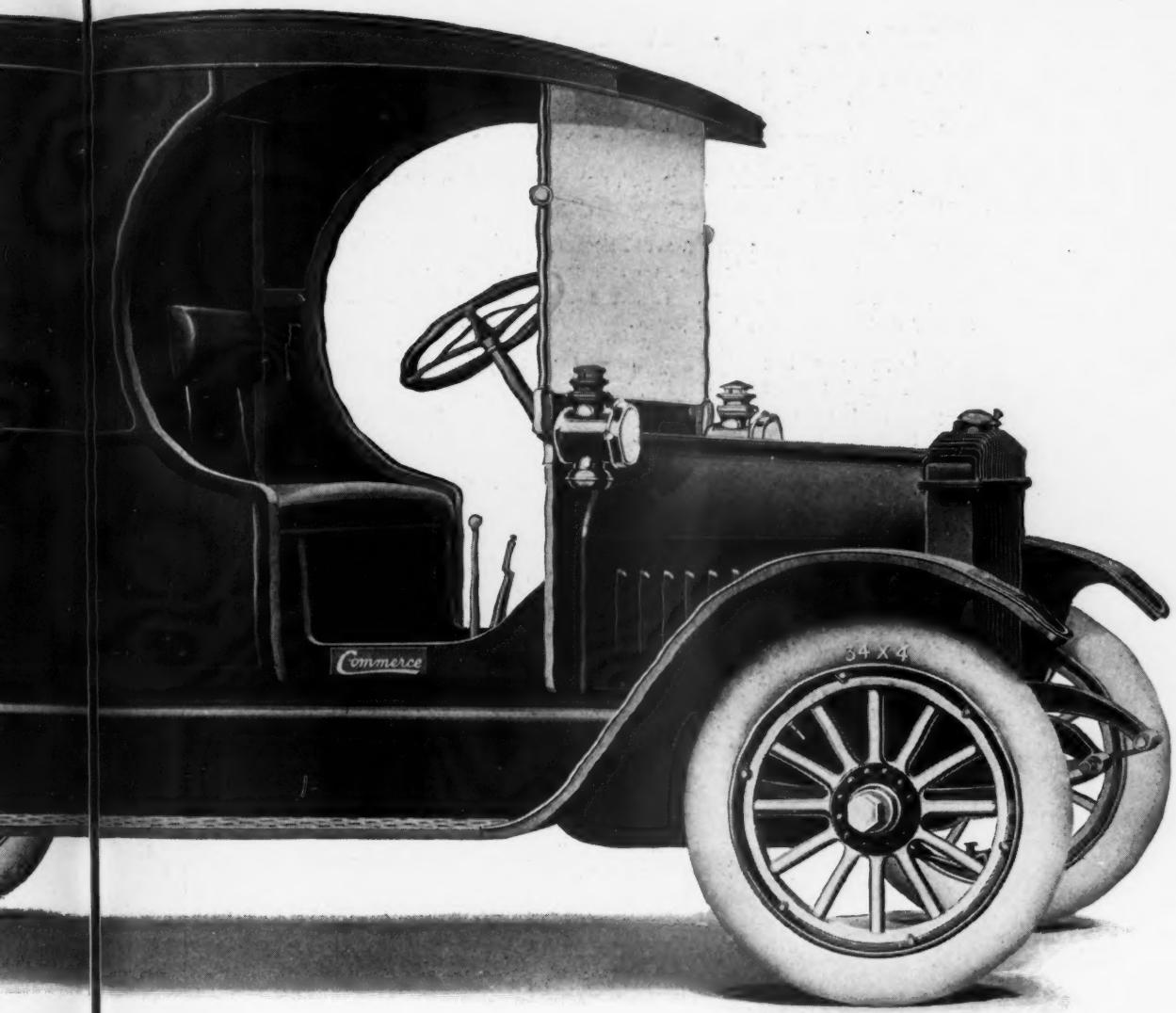
N.

1500 Pounds Capacity

Brief Specifications

Motor, Continental $3\frac{1}{2} \times 5$. Wheelbase, 120 inches. Eisemann Waterproof Magneto. Tires, 34 x 4 Pneumatic Non-Skid Rear. Loading Space, seven feet. Choice of Three Types of Bodies: Stake, and Canopy Top or Open Express with Driver's Top, in Addition to Panel Body Shown Above. Wind Shield; Hand Horn; Lamps. All Tools Complete. Cast Tank Radiator. The Commerce Truck is complete in every detail and is ready for delivery to the customer.

Commerce Truck



Model

N. C.

**Price \$975 (Including Body)
as Shown**

Brief Specifications

Demountable Rims (Spare Rim). Transmission—A Unit with the motor (3 speeds) Truck Type. Rear Axle Shaft-Driven, designed and built for us. Full-Floating Brown-Lipe Gears, 6 to 1 ratio, chrome-nickel shafts. Roller Bearings. 16" Brakes. A Truck Axle. Front Axle, Drop-Forged I-Beam Section. Springs, Vanadium Steel; Front, 36"x2½"; Rear, 50"x3"; Guaranteed 2 Years. 18" Steering Wheel. Oil Sight Feed on Dash. 14" Cone Clutch. Fenders, Latest Type.

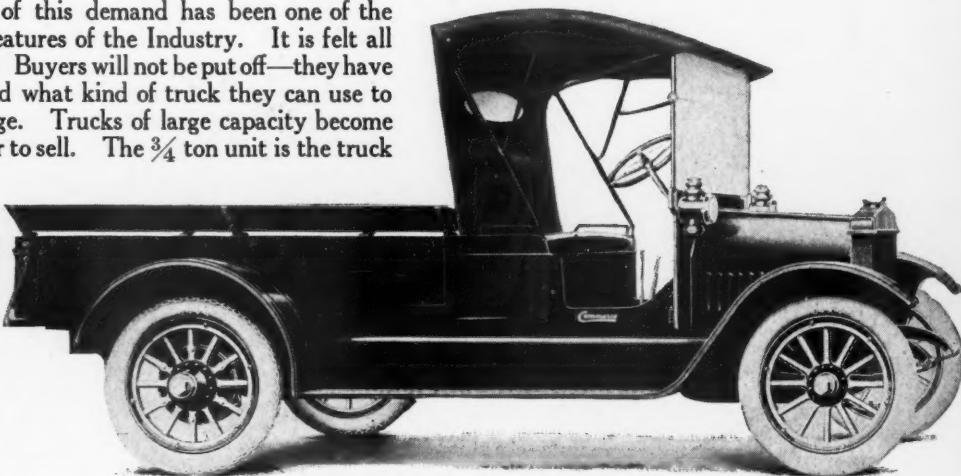
DEALERS MAKE BIG MONEY SELLING THIS TRUCK

Your opportunity is here. It is knocking at your door. If you are wise you'll lose no time in clinching it before it passes on to your competitor.

If you have watched conditions carefully, you have seen a great demand spring up recently for a dependable, efficient, durable commercial vehicle of less than a ton capacity. A demand for a good truck that would sell for less than a thousand dollars. A demand for a truck that could be operated by most any merchant in any line of business, with profit.

The growth of this demand has been one of the most amazing features of the Industry. It is felt all over the country. Buyers will not be put off—they have at last discovered what kind of truck they can use to the best advantage. Trucks of large capacity become harder and harder to sell. The $\frac{3}{4}$ ton unit is the truck of the day.

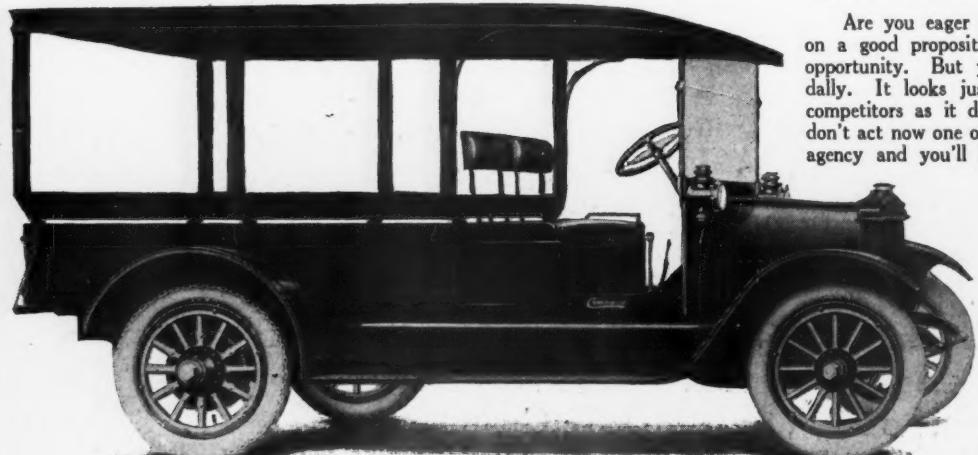
To meet this demand, various make-shifts have been offered which have not filled the bill. Discerning dealers have been waiting for a correctly designed and constructed truck offered by a company with a record of achievement back of it.



Model N. A. \$975 Complete

Such a truck has now arrived. It is the COMMERCE. It is a dependable, economical, efficient and durable vehicle. It is designed right, built right, and serves right. Its price is also right—one that any merchant can pay. It offers more value than any other truck of its price or capacity.

The field for it is tremendous. It will quickly sell—everywhere and to everybody. It will move so fast that you can turn your investment over quickly and make big profits. The agency for the COMMERCE is going to be one of the really big propositions in your town.



Model N. H. \$975 Complete

Are you eager to make money fast on a good proposition? This is your opportunity. But you can't afford to dally. It looks just as good to your competitors as it does to you. If you don't act now one of them will grab the agency and you'll have it to compete against instead of making big profits for you. Lose no time but make the wires hum today.

**Commerce
Motor Car
Company**
Detroit, Mich., U.S.A.



AU



Truck Tires Free

**Unless the Goodyear S-V
Outwears Any Other**

We now extend this Guarantee to October 1st. Many truck owners were not in shape to accept it during April, May and June. And we want every user to have this chance to prove the S-V best.

Equip opposite wheels—at the same time—one with a Goodyear S-V, one with any other standard Truck Tire of like rated size, bought in the open market. If the Goodyear S-V fails to cost less per mile than the other, we will return you its full purchase price, making the S-V free.

Get this guarantee in writing when the tires go on. Equip all the wheels you wish. Compare the Goodyear S-V with every seeming rival in this convincing way. Then you will end all your costly experimenting. Then you will know the truth.

Mileage Warrants Foolish

The habit has been, with us and with others, to give mileage warrants on Truck Tires. But that's unfair, either to you or us.

Small tires can't do what big tires do. No tire on hard roads can match good-road mileage. A mileage warrant is a simple guess on average conditions. And it must be low enough to meet bad situations.

What we can do—what we do—is to guarantee the lowest cost per mile under like conditions. We guarantee that on the Goodyear S-V, against any tire that's built.

Not alone in the limited, cautious way in which mileage is usually guaranteed. Not only

on an adjustment basis. The Goodyear S-V is entirely free, however long you use it, if any tire you match against it shows as low a cost per mile.

Why We Dare

We dare do this because we have already made 5000 tests and comparisons. Barring accidents, the Goodyear S-V will surely win against any rival Truck Tire. There are reasons for it. One is more available tread rubber. Another is no creeping, no bulging or breaking, no possible separation. The tread, the backing and the rim are one.

Our local branch will tell you where to get the S-V tires under this signed warrant.



THE GOODYEAR TIRE & RUBBER CO., Desk 94, AKRON, OHIO
Makers of Goodyear Fortified Automobile Tires

We Make Demountable, Block, Cushion, Pneumatic and Other Types of Truck Tires

Continental World-Wide Experience

From every quarter of the inventive earth, for years past, foremost men of ideas have been drawn to this one focus—the Continental Motor.

In Continental laboratories, alone larger than many complete automobile plants, these men have given their best to make good motors better.

Continental Motors

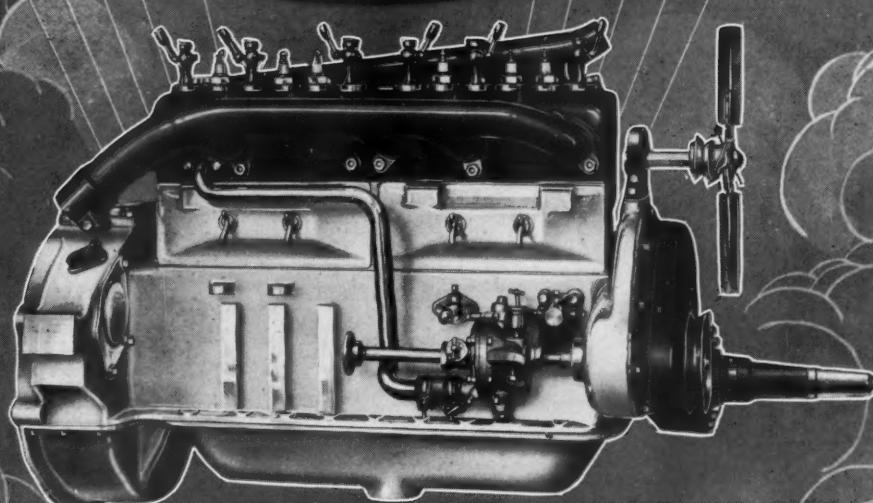
"Experience," not "Experiment," is the Continental keynote. Experience is a certainty; experiment is a hope. Continental deals only in certainties.

Any Continental motor, of any type bearing the Continental trade-mark, affords the purchaser a certainty almost without parallel in commercial transactions.

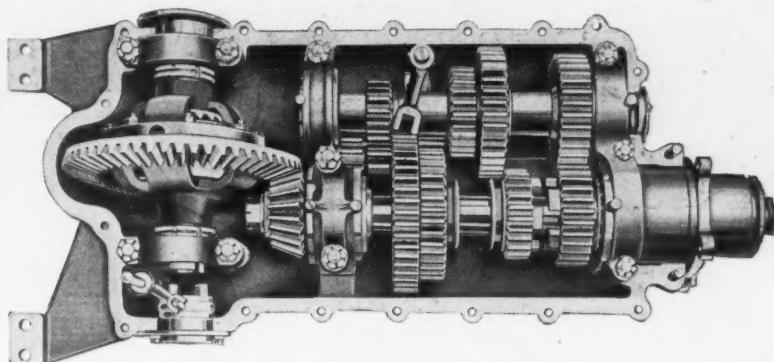
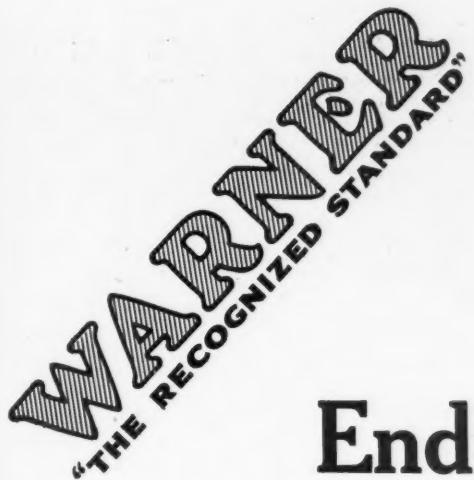
Insist on a Continental—be sure

**Continental Motor Mfg. Co.
Detroit, Mich.**

Largest exclusive motor builders in the world



When Writing, Please Say—"Saw Your Ad. in the CCJ"



Enduring Service

Get this Maximum Service from your Truck
Insist on Warner high-grade transmissions

Detroit Office

WARNER GEAR COMPANY
MUNCIE, INDIANA

967 Woodward Ave.

Warner Gear Co. Transmissions

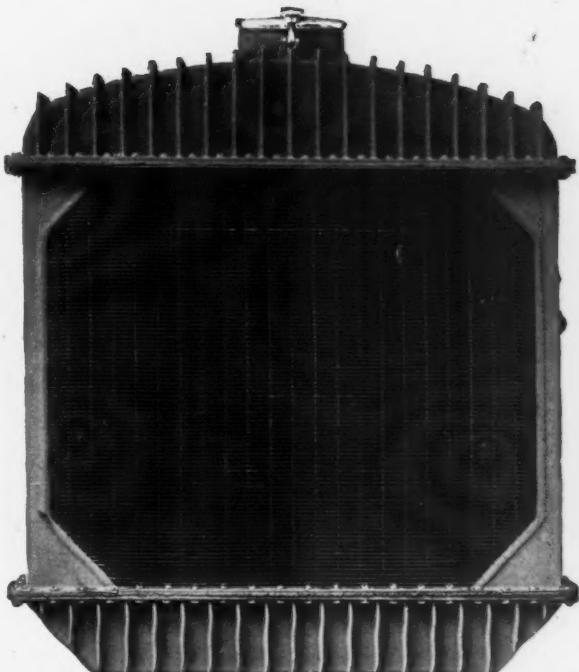
LONG COOLING SYSTEMS

CO-OPERATION with the engineering department of the best manufacturers of motor trucks and tractors has enabled us to develop and perfect many improvements which make our product the highest quality on the market and within a price that is more than consistent with same.

With our large, modern, fully-equipped plant and efficient organization we can guarantee production sufficient to meet the demands of the largest manufacturers and in accordance with our agreements.

*Several types of Long Cooling Systems
are made—Cellular, Flat Tube, Honey-
comb, Spiral Tube, Fin and Tube*

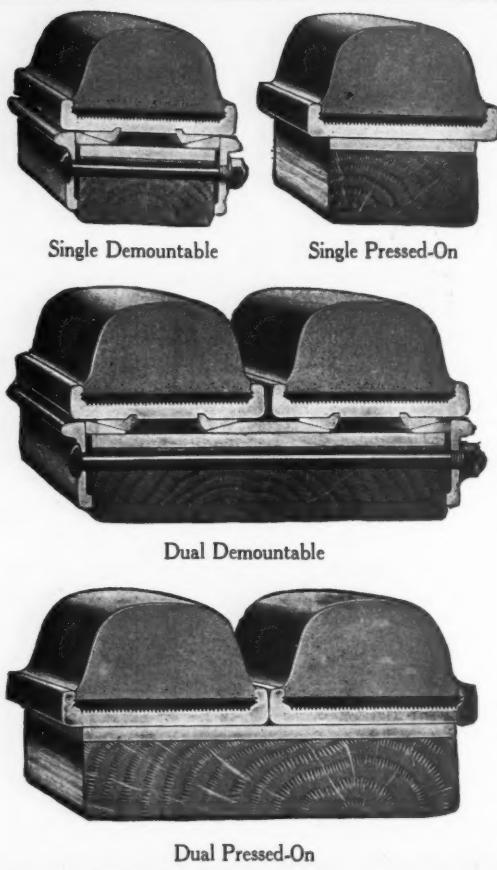
Write for catalog. Or—if you wish, we will gladly send our representative to confer with you relative to your radiation problem.



LONG MFG. COMPANY
DETROIT **MICHIGAN**

When Writing, Please Say—"Saw Your Ad. in the CCJ"

Tube and Plate Type for Truck Service



Kelly-Springfield TIRES FOR COMMERCIAL VEHICLES

Kelly-Springfield steel-base truck tires in Pressed-on and Demountable types represent the highest development in quickly applied, practical, durable and resilient tires for commercial vehicles, and are built to deliver record mileage under the severest service conditions.

Kelly-Springfield Tire Co.
Akron, Ohio

Branches in all Principal Cities

The Audit Bureau of Circulations

has just completed its second anniversary, after a most satisfactory year's work.

Through its efforts the circulations of advertising mediums have been standardized, analyzed and audited, so that the advertiser is able to choose carefully his audience, and to be **sure** that he is reaching the most desirable field for his product.

Each publisher member sells his circulation as a clearly defined, precisely analyzed commodity, set forth under uniform rules established by the leading national advertisers and advertising agencies. All his books and records are subjected to a complete annual audit by a highly trained force of expert auditors.

Detailed information about the circulation of any publisher member may be secured from the A. B. C. by any advertiser member. This information is so arranged—through standardization of forms—that you may sit at your desk and compare and weigh values and arrive at a decision in half the time it would take by any other means. Furthermore, you know that your decision is correct, because based on facts and figures that are accurate, reliable and impartial.

CHILTON PUBLICATIONS are Charter Members of the A. B. C. If you are contemplating a campaign in either the pleasure car or motor truck fields, compare the A. B. C. statements of the AUTOMOBILE TRADE JOURNAL and COMMERCIAL CAR JOURNAL with others catering to the same class. You will find that CHILTON Publications offer you the best value, not only in quantity of circulation, but in quality and buying power.

Mr. Russell Whitman, Managing Director of the A. B. C., 15 E. Washington Street, Chicago, will gladly supply any advertiser or publisher with full details.

When Writing, Please Say—"Saw Your Ad. in the CCJ"



Saves 15% on your truck insurance



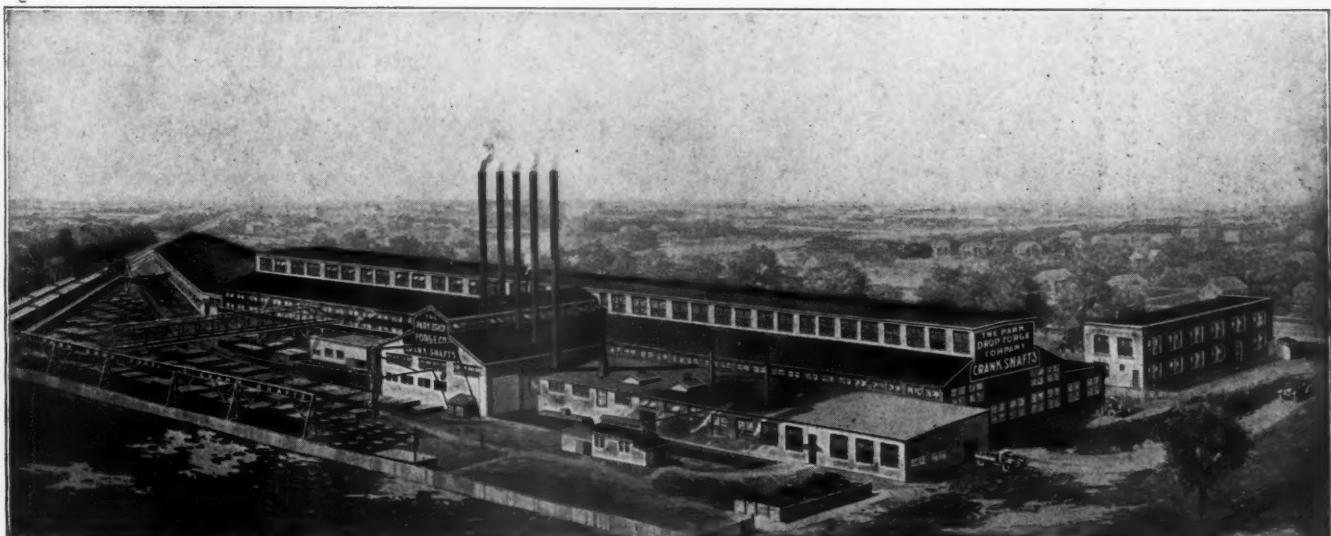
Puts fires out—quick

*Carry your own little
fire-engine on your truck*

Write for catalogue

Brass and Nickel-plated Pyrene Fire Extinguishers are included in the list of Approved Fire Appliances issued by the National Board of Fire Underwriters, and are Inspected, Tested and Approved by, and bear the label of, the Underwriters' Laboratories, Inc.

Pyrene Manufacturing Company
52 Vanderbilt Avenue New York City



**THE FIREPROOF HOME OF PARK CRANKSHAFTS
TRUCK AXLES—HEAVY DIE FORGINGS**



39 Large Hammers and Hydraulic Forging Presses, Chemical and Physical Laboratories, 16 Furnace Heat-Treating Plant

Large Stock Classified Steel—Analysis Checked in Park Laboratory

"Park Forgings" always have been guaranteed as to Chemical Analysis, Physical Properties and Bearing Hardness



THE PARK DROP FORGE CO., CLEVELAND, OHIO

Veeder HUB ODOMETER

If you are interested in preventing your profits being wasted you should by all means invest in a Veeder for each of your trucks. It will tell you exactly how far each truck travels and enable you to obtain accurate cost sheets which will make it possible to detect profit-wasting leaks. The Veeder cannot be made to fool you. It tells the truth, and the truth is necessary to protect your profits. For your pocket-book's sake see that your trucks are so equipped.



The Veeder is a very compact, rugged instrument, which is sealed on the front hub in place of the regular hub cap. It cannot be made to record backward, nor can it be removed without your knowledge, or disconnected. It registers to 100,000 miles by tenths of a mile and then repeats. The case is of drawn brass, the dials and interlocking gears of brass or bronze. Parts subjected to greatest wear are made of hardened steel.
Price, Form K, \$20. Booklet on request.

The Veeder Manufacturing Company 10 SARGEANT STREET, HARTFORD, CONN.

Makers of Cyclometers, Odometers, Tachometers, Tachodometers, Counters and Small Die Castings
T. H. CRANSTON & CO.
56 E. Randolph St., Chicago

BERNARD I. BILL
543 Golden Gate Ave., San Francisco, Cal.

Scientific proof of power

Instruments of precision like this electric dynamometer eliminate all guess work from the manufacture of Buda Motors. When you install the Buda Motor in your car or truck you don't "think so"—you KNOW.

Address BRANDENBURG & COMPANY, Facty. Reps.
57th & Broadway, N.Y. 1112 S. Michigan Ave., Chicago 1311 Dime Bank Bldg., Detroit

THE BUDA CO., HARVEY, CHICAGO SUBURB ILL.

There's no leak proof ring but the LEAK-PROOF Ring—insist

This is the



The Name
LEAK-PROOF
Stamped On
Every Ring

Piston Ring

Made by McQuay-Norris Mfg. Co.

Its use ensures

Full Motor Power—

Because, being two-piece, expansion openings are sealed and perfectly uniform bearing is obtained on the cylinder wall. This provides proper compression of every fuel charge.

Minimum Carbonization—

Because surplus oil cannot get up into the combustion chamber either through or past the ring.

Service—

Because the ring is made of special Processed Gray Iron of wonderful toughness, that never loses its elasticity and will outlast the motor.

Strength—

Because each section or half is constructed on the principle of the angle-iron—the strongest of all structural forms.

Operating Economy—

Because it makes every drop of fuel count and checks waste of lubricating oil. Being a light-tension ring, it reduces friction loss to a minimum.

Maintenance Economy—

Because it does not wear or score the cylinder and prevents the deterioration of lubricating oil caused by condensed gasoline vapor getting into the crank-case, as happens with ill-fitting piston rings.

Send for FREE Book

"To Have and To Hold Power." It tells all about piston rings and why you should equip your motor with LEAK-PROOF. How it will pay you in fuel economy and prolonged motor life. It's free.

"Ask the User"

In use on
over 300,000
motors



Sold by all up-to-date dealers, garages and repair shops.

PISTON RINGS

Avoid imitation and substitution by insisting on LEAK-PROOF

MANUFACTURED BY

McQuay-Norris Mfg. Company
Dept. C, St. Louis, Mo.

CANADIAN FACTORY: W. H. Banfield & Sons, No. 120 Adelaide St. West, Toronto

BRANCH OFFICES:

NEW YORK, 1919-29 Broadway CHICAGO, 718 Michigan Blvd. Bldg.
PITTSBURGH, 902 Second Nat'l Bank Bldg. SAN FRANCISCO, 164 Hansford Bldg.
KANSAS CITY, 513 New Nelson Bldg. LOS ANGELES, 224 Central Bldg.
DALLAS, 1509 Commerce St.

Look for the name LEAK-PROOF stamped on the Ring

HYATT QUIET



TRADE MARK REGISTERED
U.S. PATENT OFFICE 1913

The Roller
Bearing for
Motor Trucks
that With-
stands the
Hardest Usage
and Never
Requires
Adjustment

THE DOMINANT DRIVE



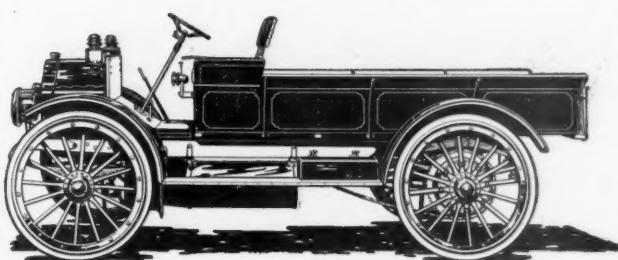
The transition from chain, bevel gear and other types of drive to worm drive has been so great that the latter is now the dominant drive in the truck field. It is found in nearly all the leading trucks and outnumbers all other types. This position has been obtained because the worm drive has proved its superiority to the other types.

We are the only exclusive manufacturers of worms and worm gears, we make more for automobile drives than any other maker, and we have the largest capacity for their production.

The Cleveland Worm & Gear Company
Cleveland, Ohio

"The Spring Is the Thing"

MATHER SPRINGS
Scientifically Heat-Treated
Genuine made only by
The Mather Spring Company
Toledo, Ohio



The Reason Why He Bought An International Motor Truck

"A neighbor of mine, a paperhanger and painter, bought an International motor truck four years ago. We thought he made an error of judgment in buying any truck, but day after day he went out with it in the morning and came back at night.

"Then the time came when we had to buy more delivery equipment. It dawned on me that I had never known my neighbor to miss a day, and when I remembered that he had been carrying men and material in it for over four years, it took me just about a minute to decide to buy an International motor truck rather than more horses and wagons. That is the reason I bought my truck, and I'm glad I did, for I'm saving money and getting just the same rain-or-shine service out of it that my neighbor got."

If you are trying to decide which truck to buy, look up some of the records for steady work made by the International motor truck. They will help you to decide right. There are three up-to-date models—"M" for 1,000 lb., "E" for 1,500 lb., and "F" for 2,000 lb. loads. One of them is just the truck for your work. A post card brings full information.

**International Harvester Company of America
(Incorporated)**
182 Harvester Building Chicago USA

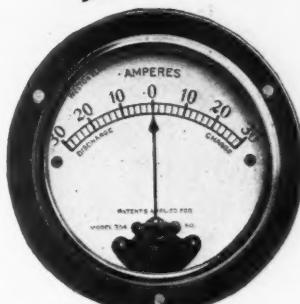
What About Lights and Starting Motor On Your Trucks?

How Do You Know When They Will Fail You?

Weston
(Model 354)

AMMETER

On Your Dashboard or Cowl



will keep you posted every minute regarding the recharging or discharging of your storage battery. It gives you warning of approaching trouble. Its exact information is invaluable—the cheapest and best insurance you can buy.

Write for full information, which will show you plainly the risk you run in operating the electric plant on your truck or car without a Weston Measuring Instrument.

Weston Electrical Instrument Co.
22 Weston Avenue, Newark, N. J.

New York	Boston	Chicago	Toronto	Berlin
Buffalo	Philadelphia	Detroit	Winnipeg	London
Cincinnati	St. Louis	Denver	Montreal	Paris
Cleveland	Richmond	San Francisco	Vancouver	Petrograd

DIXIE 20TH CENTURY MAGNETO

Wonderful simplicity of construction and accessibility of parts are striking features of this high-tension magneto, which penetrates its charge with a full spark at the lowest as well as the highest motor speeds.

**SPLITDORF
Electrical Co.**

NEWARK, N. J.

(All SPLITDORF features are fully covered by patent or patents pending)



FULLER Transmissions

Types:

Unit
Cross-Member

Nickel Gears
Ball Bearings
Dry Disc Clutch
Center Control

Trucks
3/4 to 2 Tons
2 Sizes

Complete details
on request



FULLER & SONS MFG. CO.
KALAMAZOO, MICH.

B. Gramm's Trucks



appeal to the man who has had experience in the use of motor trucks.

To him their quality points, the individual clutch transmission, guaranteed springs, self-starter, etc., mean a definite saving in operating costs.

The full line, 1 to 6 tons, with all its features, is described in our complete catalog, which will be sent you on request.

THE GRAMM-BERNSTEIN COMPANY
Dept. 1 LIMA, OHIO, U. S. A.

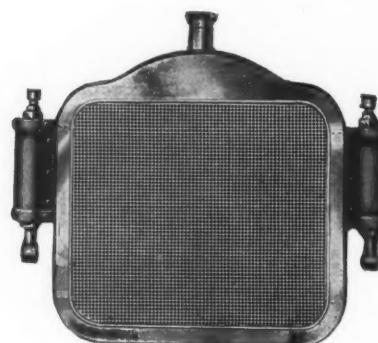
FEDDERS RADIATORS



Sometimes it takes a year or two for the quality of Fedders Radiators to become apparent.

Slowly but surely the absence of heating troubles brings to the motorist whose car is Fedders-equipped the realization that he has a radiator better than the ordinary.

The realization of Fedders Quality brings about satisfaction and there it stops. Complacent satisfaction is the hardest thing in the world to disturb—witness the continued patronage of many leading car makers whose regard for Fedders Quality indicates the opinion of their customers.



FEDDERS MFG. CO., Inc.

BUFFALO

NEW YORK

Spicer Universal Joints



Universally Accepted as the Most Dependable Flexible Connection Known to Motor Car Practice

Oil-Tight Dust-Proof

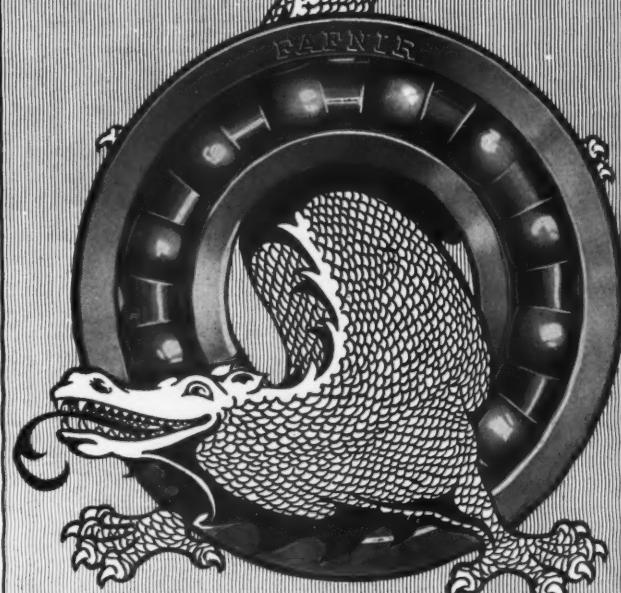
PARTS INTERCHANGEABLE

Spicer Manufacturing Company
South Plainfield, N. J.

Sales Representatives:

K. Franklin Peterson, 122 S. Michigan Blvd., Chicago
L. D. Bolton, 2215 Dime Savings Bank Bldg., Detroit
Foreign: Benjamin Whittaker, 21 State Street, New York

FAFNIR



SEND FOR CATALOG
FAFNIR BEARING COMPANY
NEW BRITAIN, CONN.

Celfor Axles Internal Gear Drive

Here are some of the features which commend these axles to truck builders:

- A solid axle to carry the load.
- A live axle to transmit the power.
- All working parts enclosed and dust proof.
- Absolute quietness of operation.
- Highest degree of efficiency obtainable.
- Lighter in weight than other types for same load.
- Power is applied near the outside of the wheel.
- Is more economical and durable in operation.
- No braking strain on power-transmission mechanism.
- No right and left-hand parts except in differential.
- Complete interchangeability of all parts.

It's worth while getting these points in detail. Our new book covers the whole subject. Send for it.

Celfor Tool Company
BUCHANAN, MICH., U. S. A.

A Shim Is—

"LAMINATED" SHIM METAL
PATENTED IN U.S.A. AND ALL FOREIGN COUNTRIES
STOCK SHEETS 6" WIDE BY 36' LONG

As Necessary as a Wrench

Motor truck service is hard. Bearings frequently require adjustments. Shims are thus as necessary in the shop as a wrench. Make your shims from

LAMINUM
The MATERIAL for SHIMS

and you'll save time, trouble, labor and expense. Don't waste time filing a solid shim! Don't fool with troublesome loose-leaf shims! Don't waste money on new shims! Be economical. Be practical. Save time, labor, expense. Use LAMINUM! It's the work of a moment—just peel off with your knife enough of these .002" laminations to get the desired thickness. Result—a smooth surface, uniform thickness, perfect adjustment, an unspoiled bearing surface—a first-class job with little work or cost.

LAMINUM comes in various forms and thicknesses. We put up a trial assortment that will just suit you. Write for prices and data.

Laminated Shim Company, Inc.
539-41 Canal Street - New York

When Writing, Please Say—"Saw Your Ad. in the CCJ"

RYERSON REINFORCED GLYCO PATENTED SKELETON CONSTRUCTION BEARINGS

for automobile, motor boat, tractor and stationary gas engines and other machinery where a removable and quickly replaceable bearing is desired.



Finished Bearing

A reinforced Babbitt bearing embodying enormous strength and resistance. A steel or bronze skeleton embedded in the Babbitt changes weakness to strength—just what steel reinforcement does to concrete.

Section showing reinforcement



Reinforced and interlocked throughout body and flanges—skeleton and Babbitt one homogeneous mass.

Demand Ryerson Reinforced Bearings in those vital parts of your engine—the connecting rod and main shaft bearing. The whole engine is no stronger than its weakest part. Inferior bearings make an inferior engine.

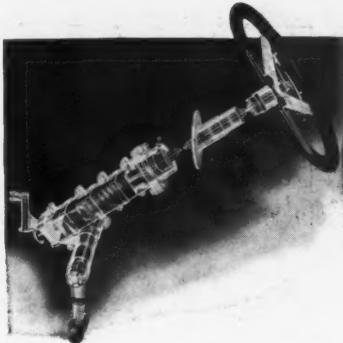
JOSEPH T. RYERSON & SON
Iron Steel Machinery
Chicago New York St. Louis

Our Skeleton Bearing Construction is Patented Here and Abroad

Steel or bronze skeleton, used in combination with whatever Babbitt metal is preferred.

ROSS Steering and Differential GEARS

will help sell your trucks



They are STANDARD on
good motor truck construction

INVESTIGATE

our new complete line of fore and
aft steering gears

Enormous bearing surfaces
Perfect lubrication

Best material throughout
Finest workmanship

Built in the largest and newest steering gear factory in the United States.

WRITE FOR CATALOG

ROSS GEAR & TOOL COMPANY
790 Heath St. :: Lafayette, Ind.

Pierce-Arrow Motor Trucks Did the Work Faster and Cheaper Than Any Other Equipment He Could Have Employed

In October, 1912, one standard 4-yard Pierce-Arrow dump truck was delivered to the John F. Casey Company of Pittsburgh, Pa. This was used as auxiliary to their teams and for general emergency purposes.

When the company was awarded the contract for excavating and constructing the Cabbage Hill Reservoir in the East End of Pittsburgh, their experience with this one Pierce-Arrow truck had proved so satisfactory that they purchased six more of the same make.

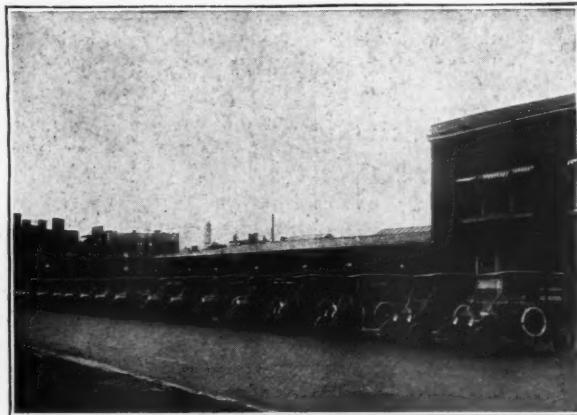
The work was started on June 20, 1914, and finished December 1, 1914, well ahead of the specified time. From the source of supply of materials the trip loaded averaged 3.5 miles up a 7% grade, and the roads were poor. The trucks worked an eleven-hour day and averaged sixteen trips each day. They hauled 5,000 tons of coal, machinery and miscellaneous freight—85,000 tons of sand and gravel and 47,000 barrels of cement.

Mr. John F. Casey, president of the company, stated upon completion of the contract that the Pierce-Arrow trucks did the work faster and cheaper than any other equipment he could have employed.

PIONEER WORM DRIVE

All Pierce-Arrow Trucks are equipped with the worm-gear drive, which is a positive guarantee of effective service under the most difficult conditions.

THE PIERCE-ARROW MOTOR CAR CO.
BUFFALO NEW YORK



Fleet of 16 Highland Bodies, Sold by our Chicago Distributors, The Erwin Greer Automobile Company.

The Right Truck for Hard Service

Whatever the requirements of service, style, capacity, or use, the Highland Body Manufacturing Company builds the right body and builds it right.

Highland Bodies include every type, open, closed, screen, stake and bus bodies,—and are made for every size of commercial car, from the light chassis to the 10-ton truck.

The designs are so standardized that Highland Bodies are built in large quantities, and we can make prompt shipments of single bodies or carload lots.

We have a catalogue showing bodies which fit your requirements.

The Highland Body Mfg. Co.
808 Elmwood Place Cincinnati, Ohio

Philadelphia

THIN PLATE BATTERIES

"Diamond Grid"

CAPACITY
ECONOMY



LIFE
MILEAGE

For Pleasure and Commercial Cars
For Sparking, Starting and Lighting

WRITE FOR CATALOGUE

Philadelphia Storage Battery Company
ONTARIO AND C STREETS
PHILADELPHIA, PA.

DEPOTS AND AGENCIES:

NEW YORK
WASHINGTON
DETROIT
MINNEAPOLIS
TORONTO
OAKLAND
SAN FRANCISCO

BOSTON
DENVER
BUFFALO
KANSAS CITY, MO.
SEATTLE
CHICAGO
LOS ANGELES

ROCHESTER
SALT LAKE CITY
CLEVELAND
ST. LOUIS
CINCINNATI
PORTLAND, ORE.
SACRAMENTO

SCHWARZ

WHEELS

Patented

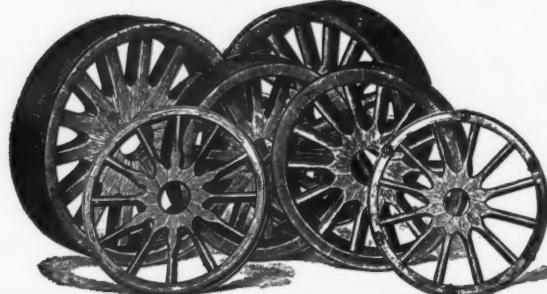
Used by the makers of most quality trucks, because they offer the utmost in strength, safety and economy.

Desired by truck buyers, because they are a known product whose superiority has been conclusively demonstrated.

Wanted by dealers, because they are an assurance of quality and make a truck easier to sell.

"Bear the Burden"—a booklet—will tell you why this is so—send for it.

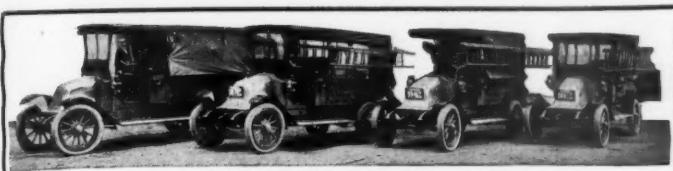
The Schwarz Wheel Co.
Frankford Philadelphia Penna.



AUGUST 15, 1915

THE COMMERCIAL CAR JOURNAL

85



Part of Fleet of 11 Stewarts in the Service of the Buffalo News

Stewart Delivery Trucks

Engineers Recommend Them

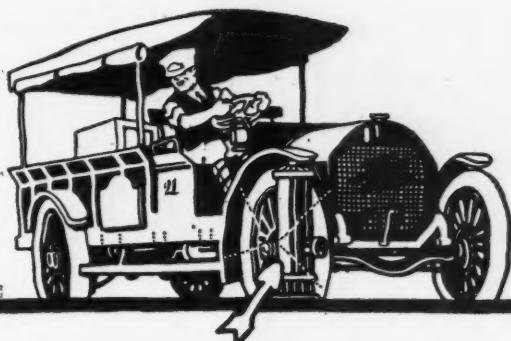
Engineers and automobile men will tell you that the mechanical parts used in the Stewart are the best known in the automobile industry. Nothing better can be purchased.

These mechanical parts, coupled with our design and construction, are reasons for the great success of the Stewart—reasons why *half* of our business comes from concerns that have grown motor-wise on *other* delivery trucks.

We have some good territory and an attractive proposition for live, aggressive dealers. Write today for further information.

Stewart Motor Corporation, Buffalo, N.Y.

Makers of Pleasure and Commercial Cars (10)



Can't break it!

TRANSIMETER Hub Odometer is guaranteed against injury to mechanism. The heavy cast housing with wide air space inside gives absolute protection.

TRANSIMETER

(Hub Odometer)

is grease- and dirt-proof. The figures do not revolve—always right side up and easily read.

Built for practical men by practical men who know the working conditions of truck operation.

Highest award at Panama-Pacific Exposition

AMERICAN TAXIMETER CO.

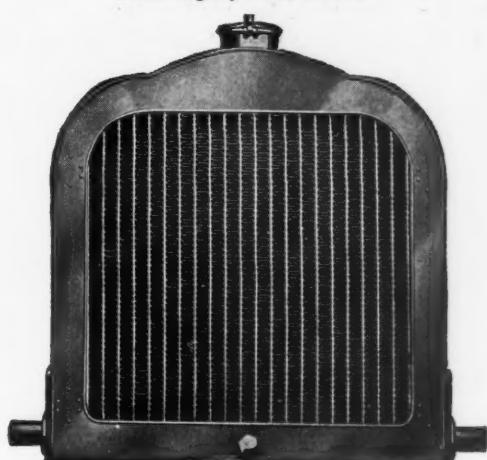
Mfrs. of Jones and Popp Taximeters

1416 Broadway New York



CANDLER TRUCK RADIATORS

Thoroughly Reinforced



Unusual Strength—High Efficiency

The Candler Special Truck Radiator is the strongest construction on the market to-day. It is highly adapted to truck use, by virtue of its efficiency, strength and durability, non-leakable and non-freezable features as well as its ease of repair.

We invite correspondence from those interested in a Practical and Serviceable Truck Radiator.

CANDLER RADIATOR COMPANY
DETROIT, MICH.



BESSEMER TRUCK

Illustration shows Model "C" which is equipped with either pneumatic or solid tires. There is more real sturdiness built into this than in any other one-ton truck on the market.

Three Models

MODEL C
1 Ton Capacity
25 H. P.—\$1250

MODEL A
1½ to 2 Ton Capacity
30 H. P.—\$1800

MODEL D
1½ to 2 Ton Capacity
Worm Drive
30 H. P.—\$2300

DEALERS: Write us about the special proposition we have for you. The Bessemer line enables you to handle every truck requirement.

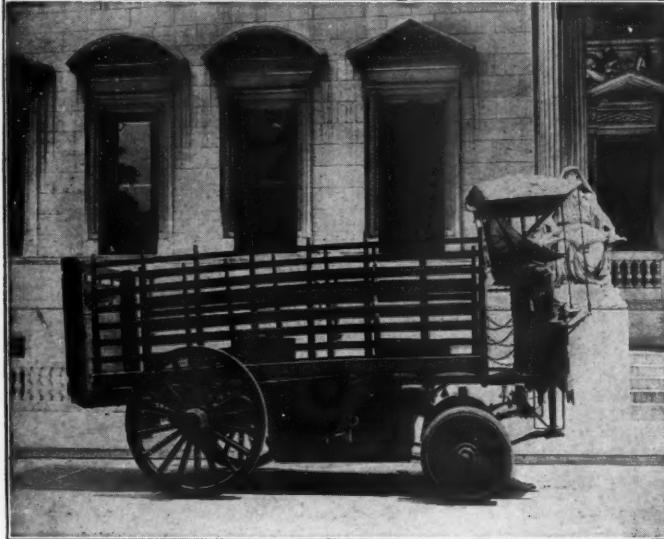
BESSEMER MOTOR TRUCK CO.
GROVE CITY, PA.

BURD HIGH COMPRESSION RINGS



WARRANTED & GUARANTEED

For Sale—All Principal Cities
FACTORY—ROCKFORD, ILL.



Boston, Mass.

Gentlemen:

We have your letter of the 16th inst. in relation to the "Couple-Gear" truck used by this Company, and would state, we have been using one for a period of over two years and it has worked out very satisfactory, so much so that we purchased a second one and I believe our New York Office has since that time purchased either two or three. We use the two wheel drive with battery, as it answers our purpose very well and the tire expense is minimum in our opinion.

Yours truly,

NATIONAL FIRE PROOFING CO.
Walter M. Evatt, Vice-Pres. and Mgr.

This economic type of wagon is saving money for others,
why not for you? Let us tell you more about it.

COUPLE GEAR FREIGHT WHEEL COMPANY
420 Buchanan Ave., Grand Rapids, Mich.

Boston, 179 W. 1st St. New York, 30th St. and 11th Ave.
Philadelphia, 522 Weightman Building

When Writing, Please Say—"Saw Your Ad. in the CCJ"



MOTOR TRUCKS

1500 POUNDS	4000 POUNDS	7000 POUNDS
\$1500	\$2200	\$3300

WORM DRIVE — WATER COOLED MOTOR
EXTRA HEAVY FRAME — UNIT TRANSMISSION

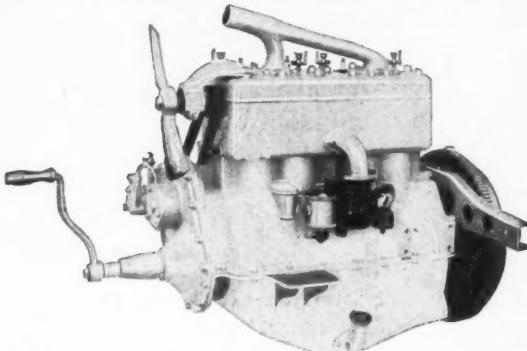
CHASE MOTOR TRUCK CO.
SYRACUSE, NEW YORK

"CHASE YOUR DELIVERY"

A New Motor
for trucks of $\frac{3}{4}$ to 1 ton capacity

THE RUTENBER MOTOR

Model 20— $3\frac{1}{2} \times 5$ —4 cylinder—30-35 H.P.



This new model is a high-grade, high-speed engine of exceptional efficiency that appeals strongly to makers of light commercial cars.

The quantity price is equally attractive, particularly to those makers who must face price competition. Write for descriptive circular.

The Rutenber Motor Company
Marion Indiana

"ALWAYS ON THE JOB"

Standard
DETROIT USA

HEAVY-DUTY
DOUBLE-DUTY TRUCKS



DEALERS:

"Standards" are the result of many years experience in designing and building high-grade, heavy-duty motor trucks. Send for Booklet B-27 describing all capacities.

Standard Motor Truck Co., Detroit, Mich.

THE PARISH & BINGHAM COMPANY

Cleveland, Ohio

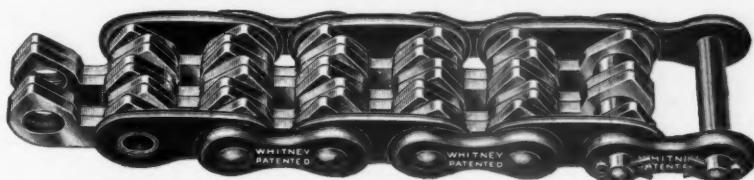
The Standard of Quality and Service

Automobile Frames and Large Steel Stampings

Our Engineering Force At Your Disposal

CULLMAN SPROCKETS

in stock and to order.



For Block, Roller and High Speed Silent Chains.
New Catalog.

Cullman Wheel Co., 1351 Altgeld St., Chicago



CRAMP BUSHINGS

Bushings, of all things, should be of proven quality. Truck Builders who aim to build faultless service and long life into their cars take no chances, they use CRAMP BUSHINGS, made of the famous Cramp Special Bearing Bronze.

Cramp Bushings have highest compressive strength and real anti-friction qualities. We are prepared to furnish bushings machined complete, ready for installation or the ingots and rough castings as you may desire.

Endow your car with the Cramp reputation by specifying Cramp Special Bearing Bronzes. Write us about it.

WM. CRAMP & SONS SHIP & ENGINE BUILDING CO., Philadelphia, U.S.A.

When Writing, Please Say—"Saw Your Ad. in the CCJ"

**Baker
Electric
Trucks**

are in service in 98 distinct lines of trade in as many different cities located in the United States, Canada, Alaska, England, France, Porto Rico, South America, South Africa, Siam, Japan and Australia. Our Truck catalog shows many of these trucks and gives interesting figures on what they have actually done. May we send it to you?

Capacities: one to five tons.
Body designs to meet any requirement.

The Baker, R. & L. Company
CLEVELAND, OHIO

ROWE MOTOR TRUCKS



are used in every line of business and in every case have proved the most economical means of hauling.

A Rowe Truck will save you money in transporting your merchandise.

The Rowe Truck is guaranteed to give

Continuous Economical Operation

Worm or chain drive. One to five tons capacity

Rowe Motor Manufacturing Co.
Downington, Pa.

GEARS

For every kind of service where quality is paramount. Van Dorn & Dutton superiority rests on these six points:

We know by experience
We produce in quantity
We manufacture complete
We machine complete
We cut only to specifications
We deliver on time

See that the Van Dorn & Dutton

Quality  Mark
is on your gears and complete differentials.
Write us today

THE VAN DORN & DUTTON CO.
GEAR SPECIALISTS
NEW YORK CLEVELAND SAN FRANCISCO



PLAIN COMPRESSION
(Patented)

WE MANUFACTURE
a full line of Plain, Leather Packed, Ratchet, Marine, Spring Compression, and many other styles of Grease Cups.

Our line of Oil Cups is equally satisfactory and complete.

Catalogue on Application



Bowen Manufacturing Co.
AUBURN, N. Y.

The four models of KREBS TRUCKS

constitute a line which will meet the requirements of practically every truck prospect in your locality.



Krebs Model F, $\frac{3}{4}$ Ton

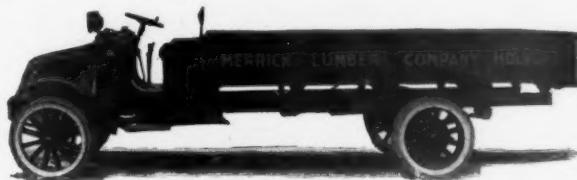
In addition to the two models shown herewith we make trucks of one and three ton capacities.

All four models are of high-grade construction and include such standard units as Timken-David Brown Worm Drive, Continental Motor, Brown-Lipe Transmission, Timken axles and bearings, Bosch ignition, Parish & Bingham Steel Frames.

In addition they have features which are distinctive to the Krebs and make each model superior to any other of its class or price.

These include the wonderful Automatic Governor which compels a driver to be economical in the operation of the truck. This is the greatest selling feature ever incorporated in a truck and it alone makes many sales.

The Krebs agency is a profitable one. If there is none in your locality you should take steps to secure it without delay. Write for complete information.



Model H, 2-Ton Truck

The Krebs Commercial Car Co.
Clyde, Ohio

THE WOOD Hydraulic Hoist

Solves the Dumping Problem for
Motor Dump Trucks



Improved Heavy-Duty Type "D" Hoist

"Made in Detroit Only"
by the

Wood Hydraulic Hoist & Body Co.
560 Franklin Street DETROIT, MICH.
Successors to
Wood Hydraulic Hoist Company, St. Paul, Minn.

TRUCK SPRINGS

There's a great difference in both the character and duration of service obtained from various makes of springs.

That difference is due to the quality of materials employed, the method of treatment, the equipment of the producing plant and the knowledge and workmanship involved.

THE SPRING PERCH COMPANY, ever since the inception of the automobile industry, has enjoyed an enviable reputation as the leading manufacturer of **QUALITY SPRINGS**, both for pleasure and commercial vehicles.

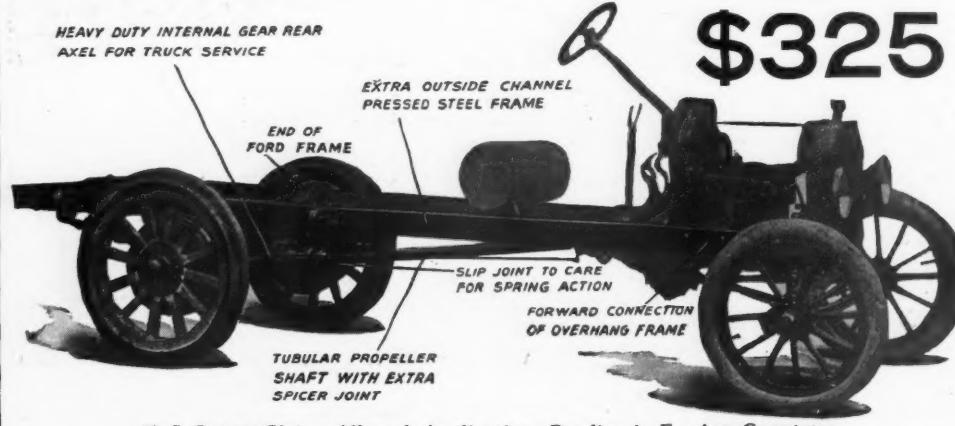
The company is equipped with furnaces of most recent and perfected models, affording absolute pyrometer heat control, and in the fabrication of SPRING PERCH CO.'S springs a unique and up-to-date equipment is employed, while thoroughly tested modern methods cover each operation.

Spring Perch Co., Bridgeport, Conn.

HUDFORD

COMMERCIAL CHASSIS

A UNIT FOR CONVERTING THE FORD INTO A ONE-TON TRUCK



U. S. Patent Claims Allowed, Applications Pending in Foreign Countries

DEALERS! The HUDFORD UNIT lists at \$325, making it possible for you to furnish your customers with a one-ton truck for \$650. We do not require quantity orders—trade discounts being given to dealers ordering a demonstrator.

WE WILL BE READY SHORTLY TO SUPPLY UNITS FOR OTHER MAKES OF CARS

HUDFORD COMPANY, 635 North Broad Street, PHILADELPHIA, PA.

Weight of complete job, 2100 pounds (Weight of HUDFORD UNIT crated, 800 pounds); H. P. 23; Wheelbase, 120 inches; Frame, 10 feet 8 inches; Heavy Truck Springs; Internal-Gear Heavy-Duty Rear Axle. The drive is by large tubular propeller shaft, with extra universal slip joint at rear end to take care of spring action. Truck Wheels; Solid Tires or Pneumatic as desired. Geared 7 to 1 or 6 to 1 as desired. The rear wheels of the Ford, with their larger tires, are put on the front, otherwise the forward construction of the Ford car remains entirely unchanged.

The HUDFORD can be attached in a few hours.

Cut shows the FORD Chassis after being converted by the HUDFORD UNIT into a one-ton truck chassis—shaded portion is HUDFORD UNIT.

How Weight Is Distributed

90% of the load is carried on the rear truck axle and frame which constitute the HUDFORD UNIT—the front of the Ford car carries practically no more weight than it would as a Ford touring car.

SIGNAL MOTOR TRUCKS

4 Models
2 Lengths Wheelbase

Worm Drive—1 Ton Worm Drive—1 1/2 Ton
\$1500 (Chassis) \$1750 (Chassis)

Worm Drive 3 1/2 Ton
\$3000 (Chassis)

Signal Motor Truck Co.
Detroit, Michigan



Watch Your Brake Lining

One smash-up spoils the truck's efficiency record for a year.

Thermoid is brake lining clear through—not merely on the surface.

It holds though worn paper thin.

It is cured under hydraulic compression into a solid substance of uniform density.

Don't trifle with the momentum of a heavy truck—harness it with Thermoid.

Thermoid Rubber Co., Trenton, N.J.
Our Guarantee Thermoid will make good—or we will

Thermoid

HYDRAULIC COMPRESSED Brake Lining - 100%



Reduces upkeep cost—and expensive delays

TUTHILL TITANIC SPRINGS

NO CENTER BOLT

recommended by engineers for

WORM-DRIVE CONSTRUCTION

Eliminates shearing off of center bolt and consequent center breakage. WRITE TODAY to our Engineering Dept. for "Facts About Motor Truck Springs"—no obligation on your part.

TUTHILL SPRING CO., 774 Polk St., Chicago, U. S. A.



TROY Trailer in use in Grand Rapids, Mich., by
The Bissell Carpet Sweeper Co.

A TROY Trailer, under the right conditions, will at least double the earning power of your Truck. If the conditions aren't right, we will frankly tell you.

Get Catalog 4 CC and full information without obligation

THE TROY WAGON WORKS CO., Troy, Miami Co., Ohio

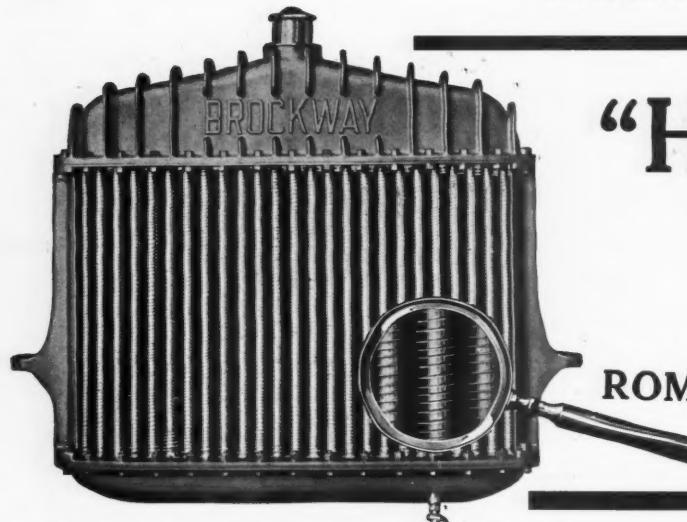
New York
50 Church St.

Detroit
113 First St.
Washington
505 Riggs Bldg.

Philadelphia
1606 Cherry St.
London, England
49 Pall Mall

Troy Trailers

When Writing, Please Say—"Saw Your Ad. in the CCJ"



"HELICAL TUBE"

Cooling Sections are guaranteed
for the life of the motor on
which they are installed.

Manufactured only by

ROME-TURNEY RADIATOR COMPANY

JASPER STREET

ROME, NEW YORK



DEALERS!

Grasp this money-making opportunity.
We have some valuable territory open.



CAPACITY
2, 2½, 3, 4
TONS

THE UNITED STATES MOTOR TRUCK COMPANY, ^{Dept. "A"} CINCINNATI, OHIO

THE correctness of its construction
combined with best quality mate-
rials and right prices make the U. S.
a splendid value for buyers and a good
proposition for dealers.

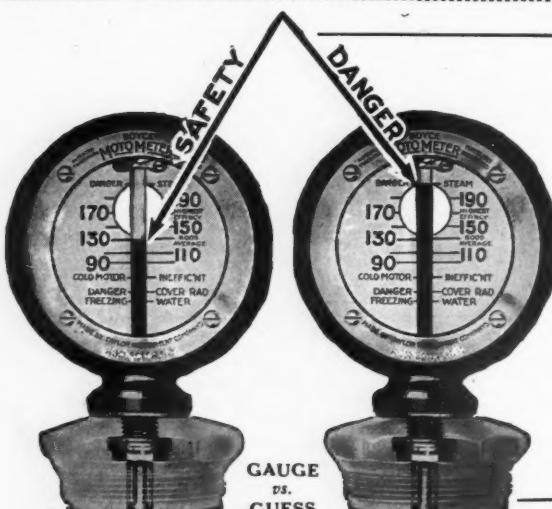
*Send for catalogue and
agency proposition*

Continental Motor Truck Company Chicago

Worm Drive

Five Sizes

1 to 4 Tons



Why Packard Trucks Have Adopted as
Standard Equipment

Boyce MotoMeter

The Radiator Heat Indicator

In the past, your drivers have perhaps trusted to "guess" to tell them when the radiator water is low; when their oil supply is insufficient; when a fan belt breaks, etc., but a Boyce MotoMeter will warn the driver miles in advance of these conditions, insuring the truck against motor damage.

During the cooler months over one-third of the gasoline can be saved by operating the motor at proper heat. Write today for full particulars.

THE MOTOMETER COMPANY 1790 BROADWAY
NEW YORK CITY

Berling Magneto



Built for
Aeroplanes
Auto Trucks
and Motor Wheels

9
8
6
4
2
1
Cylinder

Automobiles
Motorcycles

MANUFACTURERS CAN GET
NECESSARY INFORMATION FROM
ERICSSON MANUFACTURING CO.
1116 MILITARY ROAD, BUFFALO, N.Y.

WAUKESHA 4 $\frac{1}{4}$ x 6 $\frac{3}{4}$ LONG STROKE TRUCK MOTOR.

THE Waukesha Long Stroke Truck Motor is designed solely to meet the requirements of truck service and so solves with maximum efficiency the truck user's delivery problem.

It is the truck manufacturer's strongest justification for re-orders. Its positive, definite, unvarying efficiency under all working conditions gives the purchaser of the first truck a totally new idea in truck service that makes your hold on his future truck requirements a foregone conclusion.

Exclusive processes in metals used give the Waukesha strength unapproached by any other motor. The crankshaft has a tensile strength of 140,000 lbs. to the square inch. The bearings have greater resistance than the best Parsons' White Brass. The unusual strength of these two features is but an index to the character of the motor as a whole.

As a progressive manufacturer of trucks you should at least know all about the Waukesha. Your request will bring full information.

WAUKESHA MOTOR CO.
WAUKESHA Dept. A. WISCONSIN

AN EXCEPTIONAL MOTOR.



Jeffery Armored Quad

Drives, Brakes and Steers on All Four Wheels

The Jeffery Quad negotiates mud, sand, snow and hills impassable to rear-wheel-drive trucks. Its superiority demonstrated in a spectacular way in European War. Adopted by eight governments and by big business concerns as rapidly as the trucks can be built in the Jeffery plant. Write for free haulage data.

The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin

G. V. ELECTRIC TRUCKS

SIX MODELS: 1,000 POUNDS TO 5 TONS



Nearly 5,000 in use
Catalog on request

General Vehicle Company, Inc.

GENERAL OFFICES AND FACTORY
LONG ISLAND CITY, NEW YORK

NEW YORK :: CHICAGO :: BOSTON :: PHILADELPHIA



Whena Man Buys a Truck

the first thing he wants to know is what kind of a motor it's got. He wants to be sure first of all of the power plant. He wants a motor with a record behind it, a motor that other truck owners have tested out for him, that they have found stands up to the grind of hard, grueling work day in and day out, year in and year out.

Wisconsin Motors

have won their high standing because of the service they have given. They are durable, economical, dependable.

**TYPE T-U
4" BORE
6" STROKE**
INTAKE VIEW

**TYPE U-U
4 1/4" BORE
6" STROKE**
EXHAUST VIEW

Wisconsin Motor Mfg. Co.
Station A, Dept. 320
Milwaukee
Wisconsin

Write now for special catalog

BESCO

STEEL WHEELS

The Ideal Wheels for Heavy-Duty Trucks

Among their many advantages are the following:

Come machined, ready for tires and bearings; adaptability to all drives; greater strength; equal distribution of strain; absolutely true; lighter in weight; not affected by climate; faster, neater, cleaner, do not pick up mud, snow or ice; cost no more, though better.

The capacity of our foundry and machine departments have been increased so that we can now turn out 12 sets of wheels per day. Send for catalog and data.

BUCHANAN ELECTRIC STEEL CO.
BUCHANAN, MICH.

EISEMANN

OF THE 93 manufacturers who use Eisemann magnetos in this country, 69 are truck makers.

If you are not one of the 69 Eisemann users you are not getting the greatest possible ignition efficiency.

The Eisemann Magneto Co.
Sales and General Offices
32-33rd Street, Brooklyn, N.Y.

New York, 245 West 55th Street
Indianapolis, Ind.,
415-417 North Capitol Ave.
Detroit, Mich., 802 Woodward Ave.

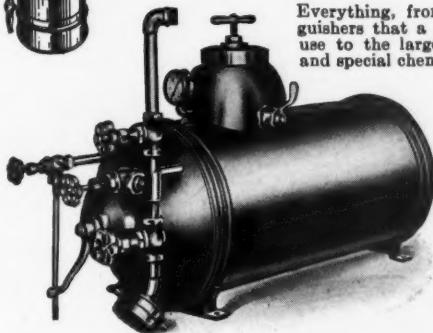
PIERCE Speed Controller

THIS is one of the three most efficient and extensively used speed controlling devices made in this country. The other two are also Pierce products. Some one of them should be on every truck you own. Write us for information.

PIERCE SPEED CONTROLLER CO.
Anderson, Indiana, U.S.A.



DEPENDABLE Chemical Fire-Fighting APPARATUS



Everything, from the hand extinguishers that a woman or child can use to the large Chemical Engines and special chemical tanks for Fire Department service.

Into each is put material and workmanship that cannot be excelled. Designs are shown by actual use to be beyond improvement.

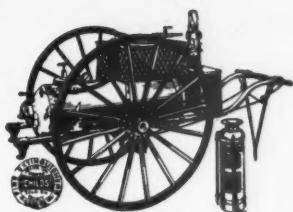
Result: Perfect and immediate action when needed, no deterioration from lack of use or age.

All Our Tanks Are Made of Copper

The name "CHILDS" stands for perfection.

Chemical Tanks for Fire Department or other service made to order.

Write for our Complete Catalogue and interesting talk on Fire Apparatus.



O. J. CHILDS CO., Utica, N. Y.

MANUFACTURERS FIRE APPARATUS

USE ALL YOUR FUEL

Don't put up any longer with that old-fashioned, riveted gasoline tank. Sooner or later it's bound to spring a serious leak and then fire or explosion is mighty apt to result. Even now it may be leaking, slightly indeed, but enough to make a difference between the gasoline you buy and that actually used for power. Make your truck fire and explosion proof, and get the use of every drop of fuel by using

"JASCO TANK"



The drawn steel, seamless, tinned and tested gasoline tank that cannot leak under any service. All styles and sizes. At your dealer's or direct.

JANNEY, STEINMETZ & CO.

Main Office: PHILADELPHIA

New York Office: Hudson Terminal Building

LAVIGNE STEERING GEARS

The Peer of Gears For quality Motor (cars) (trucks)

We are Steering Gear specialists.

We command the largest percentage of the Steering Gear business.

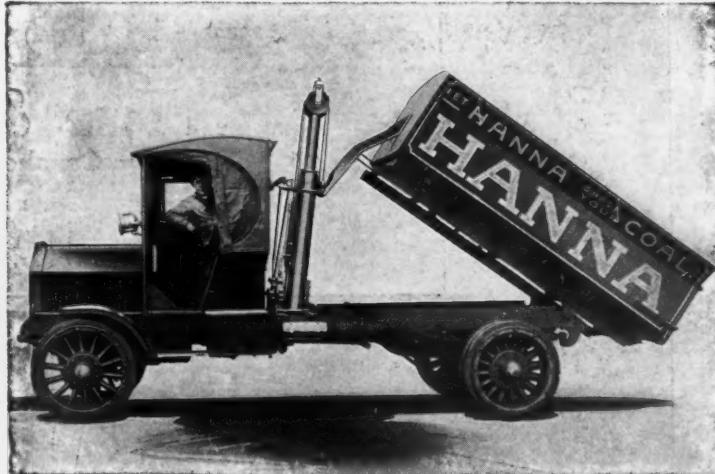
All of our product is made of the highest grade materials, all working and wearing parts made from alloy steels, pack hardened, water and oil treated, ground to gauges. Insuring interchangeability, easy steering and irreversibility.

**The Value is honest
The Judgment expert
The Sale sincere**

Write for detailed information.

LAVIGNE GEAR CO.

Racine - - Lock Box 324 - - Wisconsin



The Latest Type Wood Hydraulic Hoist

made to fit any chassis. Will dump a load in thirty seconds. Great time saver in hauling coal and building material.

Write for our descriptive booklets and prices

Hydraulic Hoist Mfg. Co.

172 West Fifth Street

Saint Paul, Minn.

Original builders and successors to Wood Hydraulic Hoist Company

Two of the many reasons why GIBNEY TIRES make such phenomenal service records are shown below. They are the physical and chemical laboratories of our plant. In them takes place the searching test of materials and ingredients which go into the making of the best solid tires the world knows.

Anything which passes that searching ordeal is right and the tire in which it is incorporated cannot fail to give adequate service. This is the real secret of GIBNEY success—best materials, right formula, advanced and thorough methods of manufacture.

It's no wonder both dealers and users enthuse over GIBNEY PRESSED-ON and DEMOUNTABLE TIRES. You will too, after you read our House Booklet, "From Crude Gum to the Finished Tire"—free on request.

GIBNEY

Tire & Rubber Co.

Factory, Conshohocken, Pa.

BRANCHES:

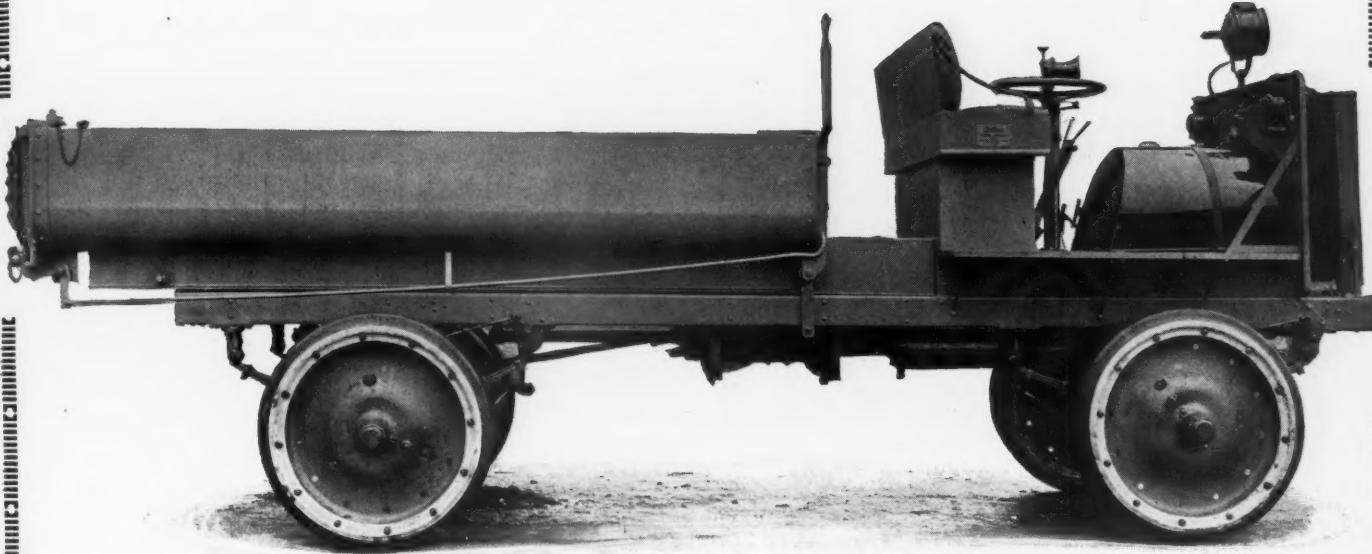
New York, Philadelphia, Boston, Detroit, Chicago, London, Paris
 AGENCIES—Washington, Baltimore, Norfolk, Wilmington, Harrisburg, Scranton, Cincinnati, St. Louis, Kansas City, Milwaukee, St. Paul, Minneapolis, Duluth, Paterson, Elizabeth, Newark, Worcester.

When Writing, Please Say—"Saw Your Ad. in the CCJ"



Steel Bodies for Motor Trucks

Outlast the trucks on which they are placed



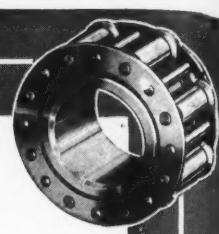
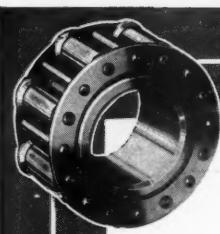
Whatever may be your haulage requirements, no matter how unusual or severe the service, we can supply you with steel truck bodies that will be best adapted to your needs and give you dependable and highly efficient service.

Many makers of high-grade trucks, such as the Jeffrey Quad, shown above, use our bodies with the utmost satisfaction. Our hoist-power or hand and dump bodies, in particular, have achieved remarkable success.

*Send for our complete data and prices, giving
body dimensions and nature of business.*

MOTOR TRUCK BODY DEPARTMENT

Variety Manufacturing Co., Sacramento and Carroll Avenues, Chicago, Ill.



One Bower Bearing cannot differ from another by $\frac{1}{160}$ the thickness
of the white line in the border

86

At the date this is written 86 American Manufacturers of pleasure cars and motor trucks are using Bower Roller Bearings. The rapidly increasing list is excellent testimony to the satisfaction afforded by these bearings. Write for the list--it will be longer by the time your letter reaches us.

Bower
Roller Bearing Co.
Detroit, Mich.

Write for complete information and list of users



When Writing, Please Say—"Saw Your Ad. In the CCJ"



COVERT TRANSMISSIONS

The name COVERT is an assurance of service and satisfaction. It stands for quality. It represents efficiency. It signifies simplicity of construction. It assures durability. It indicates the greatest transmission value. It means economy in assembling and of operation. It's the name that will help sell your product.

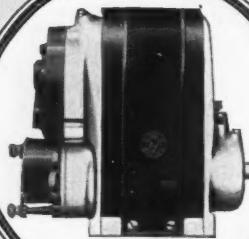
We make transmissions for all types of pleasure cars and trucks. Consult our engineers concerning your requirements.

COVERT MOTOR VEHICLE COMPANY
FACTORY, LOCKPORT, N.Y. SALES OFFICE, DETROIT, MICH.

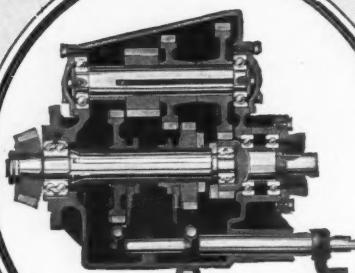
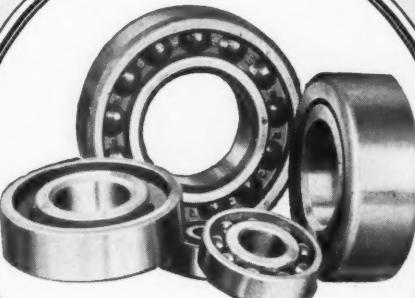
NEW DEPARTURE BALL BEARINGS

American Made for American Trade

are Manufactured in Types, Sizes, Capacities
and Quantities suited to every purpose



High Speeds
Light Loads



Medium Speeds
Medium Loads



Slow Speeds
Heavy Loads

The pictures tell
... the story ...

A large percentage of
American made Motor Car
Models for 1916 will con-
tain New Departures be-
cause of their complete
adaptability . . . by reason
of their inherent goodness
. . and because they are
absolutely

Guaranteed

Our expert knowledge of Ball
Bearing installation is free to
every manufacturer of Motor
Cars . . . Promptly upon
request.

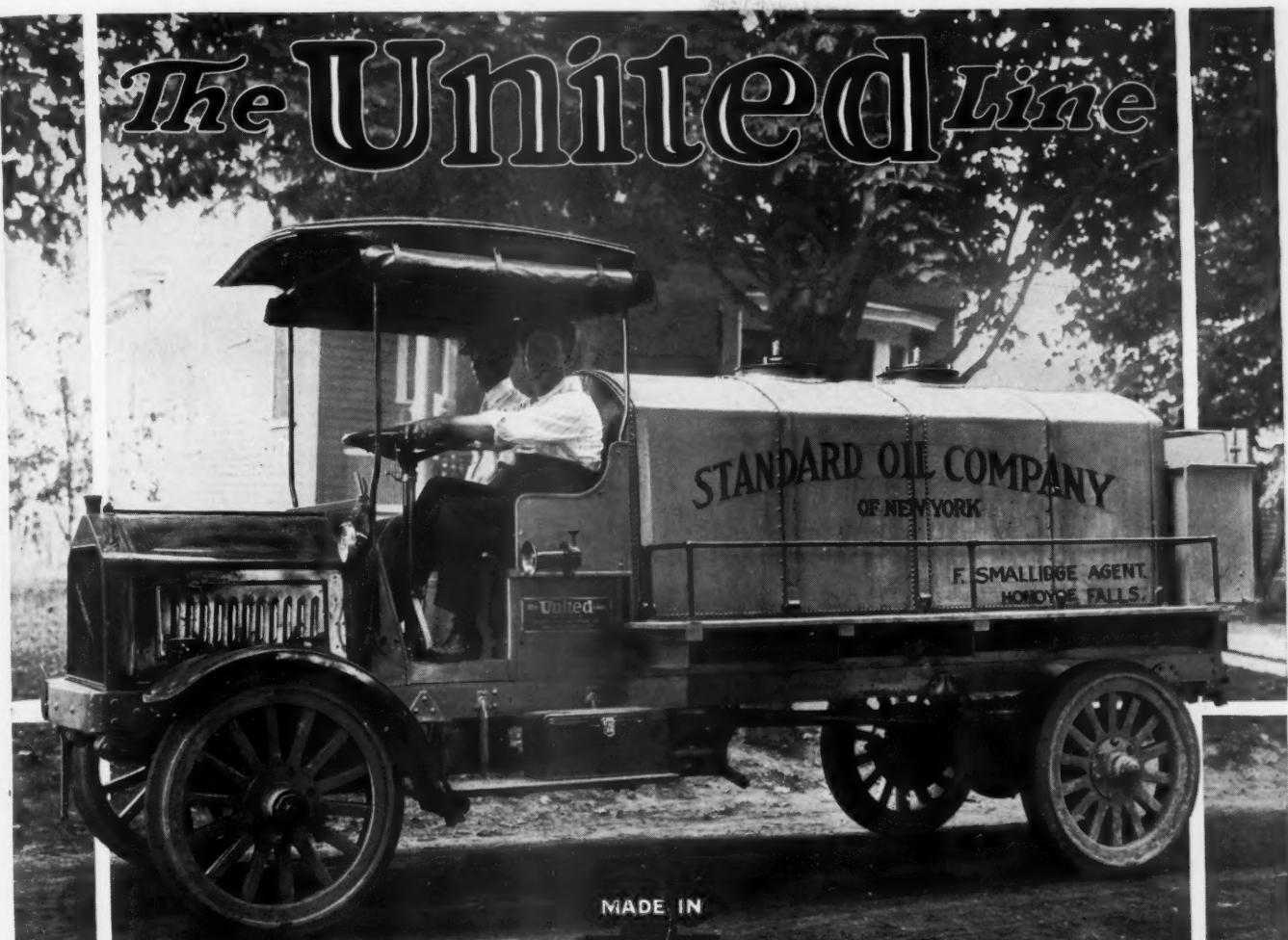
The New Departure Manufacturing Company

Distributors in Trade
Centers Throughout
the United States

BRISTOL, CONN., U. S. A.

Western Branch: 1016-17 Ford Bldg., Detroit, Mich.

Sole British Agents
Brown Bros., Ltd.,
London & Manchester



2 Ton Truck \$2250
3½ Ton Truck \$2900
5 Ton Truck \$3400



All Worm Drive
Right or Left Hand
Prices F. O. B. Grand Rapids

Suppose YOU were building trucks:

If seven of the greatest engineers in the Commercial Car field had confirmed the correctness of your designing;

If every unit in your trucks was the pet product of the leading manufacturer in that line—such as Continental Motor, Eisemann Magneto, Gemmer Steering Gear, Perfection Springs, Stromberg Carburetor, Brown-Lipe Transmission, Timken Bearings, Sheldon or Timken Axles, Mayo Radiator, Spicer or Kinsler-Bennett Shaft, etc.;

If your product left nothing to be desired in matters of simplicity, strength, safety, economy and efficiency;

If you were amply financed and were enjoying a prosperous business necessitating continual enlargement of factory space;

If you had an organization so perfected as to guarantee the perpetuation of your business far into the years, strongly entrenched against every contingency;

If the names of many of the largest truck users in the United States were making their appearance on the sides of your trucks;

—If all these things were true, as they are with us, would you be surprised if many dealers, large and small, should join hands with you and make a success of it right from the start?

And then if a responsible man in open territory should write or wire for details regarding your proposition to dealers, would you give him an immediate, full and satisfying reply?

We will do all that—and besides, we will refer the inquiry to a district representative who will give the matter his personal attention.

If you happen to be interested in the very desirable opportunity offered today by the United line, don't let procrastination spoil your good intentions.

We like to open telegrams

United Motor Truck Co.
Grand Rapids, Mich.



New line now includes 7 models 1000 lbs. to six tons—\$950 to \$4350

AFTER a careful and *scientific* study into all phases of haulage requirements, we announce an increase in our line to 7 models — ranging from a 1000 lb. delivery body to a 6-ton truck. The new line of KisselKar Trucks is designed to supply most economical delivery under every haulage condition which may arise.

KISSELKAR TRUCKS

Seven Great Models

Here is the new line and chassis prices:—

1000 lb. delivery	\$ 950
3/4 to 1 ton truck	\$1500
1 to 1 1/2 ton truck	\$1750
1 1/2 to 2 ton truck	\$2100
2 1/2 to 3 ton truck	\$2750
3 1/2 to 4 ton truck	\$3350
6 ton truck	\$4350

The specifications and details of this wonderful range of trucks are so important that it is impossible in this announcement to more than ask that those interested write at once for complete literature.

For Your Business Learn in detail the construction of these great trucks—both worm and chain drive models—and their adaptability to your peculiar problem. They are the most modern trucks on the market.

Kissel Motor Car Company, 194 Kissel Ave., Hartford, Wis.

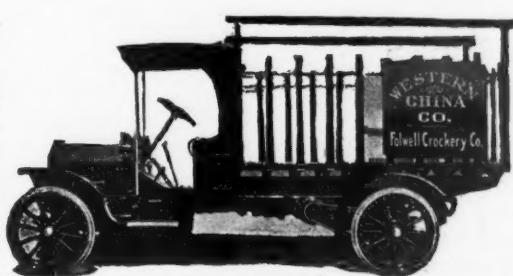
New York, Boston, Chicago, Philadelphia, St. Louis, Milwaukee, Minneapolis, St. Paul, Dallas, San Francisco, Los Angeles, Oakland, Omaha, Cleveland, Detroit, Toledo, Columbus, Rochester, Buffalo, Baltimore, Pittsburgh, Duluth, Seattle, New Orleans, Nashville, Hartford, Conn.; New Haven, Troy, Norfolk, Providence, Marshalltown, Ia.; Madison, Montreal, Toronto, Calgary, Victoria, and three hundred other principal points in the United States and Canada.

Advertisers' Index

American Taximeter Co.	85	Electric Storage Battery Co.	62	Lippard-Stewart Motor Car Co.	64	Schwarz Wheel Co.	84
Autocar Co.	2	Ericsson Mfg. Co.	93	Locomobile Co. of America.	Inside Front Cover	Selden Truck Sales Co.	67
Baker R. & L Co.	88	Fafnir Bearing Co.	82	Long Mfg. Co.	75	Sheldon Axle & Spring Co.	52
Bessemer Motor Truck Co.	85	Fedders Mfg. Co., Inc.	82	McGraw Tire & Rubber Co.	50	Signal Motor Truck Co.	91
Bowen Mfg. Co.	88	Firestone Tire & Rubber Co.	43	Mather Spring Co.	80	Spicer Mfg. Co.	82
Bower Roller Bearing Co.	98	Fuller & Sons Mfg. Co.	81	Motometer Co.	92	Splitdorf Electrical Co.	81
Bowling Green Motor Truck Co.	103	General Motors Truck Co.	66	New Departure Mfg. Co.	100	Spring Perch Co.	90
Buchanan Electric Steel Co.	94	General Vehicle Co., Inc.	93	Packard Motor Car Co.	104	Standard Motor Truck Co.	87
Buckeye Jack Mfg. Co.	103	Gibney Tire & Rubber Co.	96	Parish & Bingham Co.	87	Stegeman Motor Car Co.	51
Buda Co.	78	Goodyear Tire & Rubber Co.	73	Park Drop Forge Co.	77	Stewart Motor Corporation.	85
Burd High Compression Ring Co.	86	Gramm-Bernstein Co.	82	Philadelphia Storage Battery Co.	84	Thermoid Rubber Co.	91
Candler Radiator Co.	85	Highland Body Mfg. Co.	84	Pierce-Arrow Motor Car Co.	84	Torbensen Gear & Axle Co.	55
Celfor Tool Co.	83	Hudson Co.	90	Pierce Speed Controller Co.	94	Troy Wagon Works Co.	91
Chase Motor Truck Co.	86	Hyatt Roller Bearing Co.	79	Polack Tyre & Rubber Co.	Back Cover	Tuthill Spring Co.	91
Childs, O. J., Co.	95	Hydraulic Hoist Mfg. Co.	95	Pyrene Mfg. Co.	77	United Motor Truck Co.	101
Chilton Co.	54, 68	International Harvester Co. of America, Inc.	81	Republic Motor Truck Co.	57, 58, 59, 60, Front Cover	United States Motor Truck Co.	92
Cleveland Worm & Gear Co.	80	International Motor Co.	47	Rome-Turney Radiator Co.	92	Van Dorn & Dutton Co.	88
Commerce Motor Car Co.	69, 70, 71, 72	Janney, Steinmetz & Co.	95	Ross Gear & Tool Co.	83	Variety Mfg. Co.	97
Continental Motor Mfg. Co.	74	Jeffery, Thomas B., Co.	93	Rowe Motor Mfg. Co.	88	Veeder Mfg. Co.	78
Continental Motor Truck Co.	92	Johns-Manville, H. W., Co.	63	Russel Motor Axle Co.	Inside Back Cover	Warner Gear Co.	75
Couple-Gear Freight-Wheel Co.	86	Kelly-Springfield Tire Co.	76	Rutener Motor Co.	86	Waukesha Motor Co.	93
Covert Motor Vehicle Co.	99	Kissel Motor Car Co.	102	Ryerson, Jos. T., & Son.	83	Weston Electrical Instrument Co.	81
Cramp, Wm. & Sons, S. & E. Bldg. Co.	87	Knox Motors Associates.	61			West Steel Casting Co.	56
Cullman Wheel Co.	87	Krebs Commercial Car Co.	89			White Co.	45
Diamond T. Motor Car Co.	48, 49	Laminated Shim Co., Inc.	83			Wisconsin Motor Mfg. Co.	94
Edison Storage Battery Co.	65	Lavigne Gear Co.	95			Wood Hydraulic Hoist & Body Co.	89
Eisemann Magneto Co.	94						

DEALERS, ATTENTION!

MODERN
THE BOWLING GREEN MOTOR CAR COMPANY
TRUCKS FOR 1915



Standardized thruout, Modern from radiator to tail lamp, built in chain and worm-drive models.
Just the truck to get the business in your territory.

Live dealers should write for catalog.

THE BOWLING GREEN MOTOR TRUCK CO., Bowling Green, Ohio

BUCKEYE Motor Truck Jacks

Buckeye Motor Truck Jacks are safe, reliable and made to stand the wear and tear for which they are intended. They are fully guaranteed, and cannot possibly drop with a load. They are made from Steel Drop Forgings, best finish and workmanship throughout.

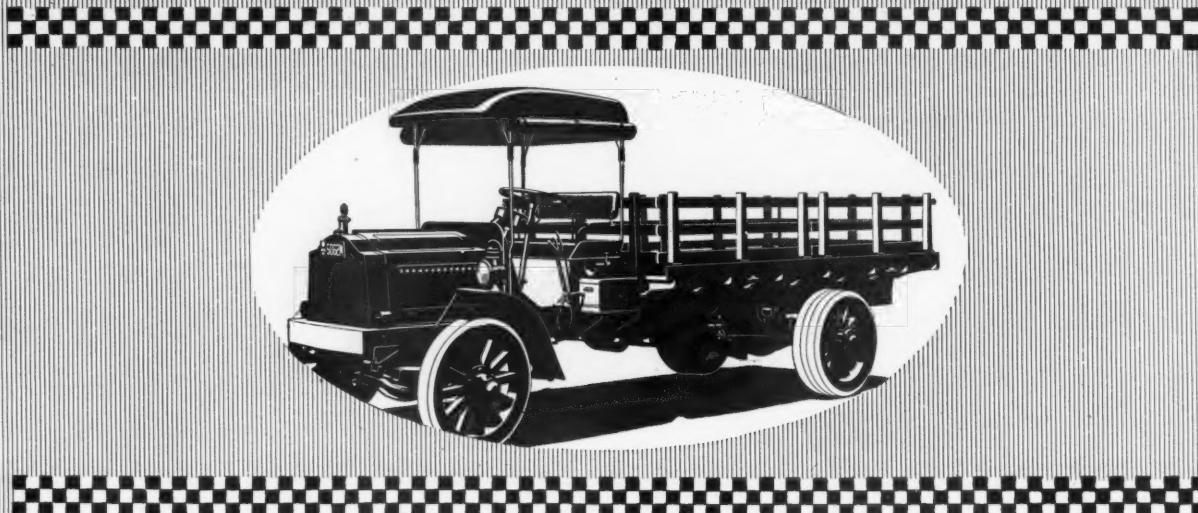
Get our prices before you place your orders for jacks, we can save you money.

No.	Height Bar Down	Raise Bar	Height Bar Up	Weight	Capacity	List Price
7	11 1/4"	6 1/2"	18"	16 lbs.	2 1/2 tons with formed handle	\$10.00
13	14 1/4"	7 1/2"	20 1/2"	26 1/2 "	3 "	15.00
14	14 1/2"	7 1/2"	20 1/2"	33 "	5 "	16.00
14	11 1/2"	7 1/2"	20 1/2"	35 "	5 "	22.50

Write today for descriptive catalog. Made only by

THE BUCKEYE JACK MFG. CO. - Alliance, Ohio

When Writing, Please Say—"Saw Your Ad. in the CCJ"



*The ASSURANCE of CERTAIN SERVICE
and a COMPLETE SERIES of MODELS
COMBINE TO MAKE the*

Packard

NEW MODEL CHAINLESS TRUCKS
the ESSENTIAL BUSINESS CARRIER

For every province in the broad domain of transportation there is a Packard truck conceived and constructed to meet and fulfil its demands.

In seven sizes — 1-ton, 1½-ton, 2-ton, 3-ton, 4-ton, 5-ton and 6-ton — Packard Chainless trucks comprise the first and only comprehensive and consistent, fully up-to-date series.

Built deep into every Packard truck from headlight to tail-board, are Packard standards and Packard responsibility. And the resources of the greatest motor truck shops and the cumulative experience of seven years of successful truck building are concentrated and impregnated in every truck produced.

To the Packard truck user this means economical and positive operation, long and gainful utility, certain and satisfactory service.

Packard pre-eminence is a fact: an achievement which won for the Packard exhibit in the motor vehicle section of the Panama-Pacific International Exposition the FIRST MEDAL of HONOR, and the *only* GRAND PRIZE.

PACKARD MOTOR CAR COMPANY, DETROIT, MICH.

Russel

INTERNAL GEAR DRIVE AXLES

A A YOUNG President

C C VON HAMM Vice President

GEORGE W FARR Treasurer

WILLIAM P JOHNSON Secretary



CABLE AND WIRELESS ADDRESS
"YOUNGCO"
WESTERN UNION CODE
A. S. C. 4TH EDITION
EXCELSIOR CODE SYSTEM

ADDRESS ALL COMMUNICATIONS
TO THE COMPANY AND
NOT TO INDIVIDUALS

Russel Motor Axle Company,
North Detroit, Mich.

Gentlemen:

We are in receipt of your letter under date of June 8th in regard to the work which your axles are doing in this country.

In reply we are very glad to state that we have had perfect satisfaction from all of the Russel axles in operation and about our Territory and have not had to make one single adjustment of any description. The axles are all running very quietly and we have absolutely nothing to criticise about them.

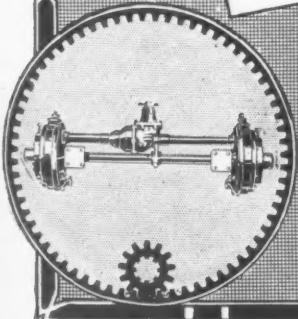
Yours very truly,
THE von HAMM YOUNG COMPANY, LTD.
per *E. B. Dodge*

EEB:EL

Proof of Serviceability

Every one of the Internal Gear Rear Drive Axles which we have sold has been and is now giving satisfactory uniform service under trucks. The most exacting experience with trucks using the Russel Internal Gear Axle has proven beyond question the correctness of this principle and of Russel design, and has demonstrated the dependability of Russel reputation for high quality of workmanship and materials.

Russel Motor Axle Company, North Detroit, Michigan



When Writing, Please Say—"Saw Your Ad. in the CCJ"

On the Crest of Popularity's Wave

POLACK TYRES

ASK
POLACK
USERS

10,000
MILES
GUARANTEE
INVARIABLY
EXCEEDED

INSURE TRUCK SERVICE

POLACK TYRE & RUBBER Co.

1876 BROADWAY, -- NEW YORK.

ALBANY
BALTIMORE
BUFFALO
BOSTON
BRIDGEPORT

CHICAGO
CINCINNATI
CLEVELAND
CHARLESTON
DAYTON

DETROIT
GRAND RAPIDS
KANSAS CITY
LOS ANGELES
MONTREAL

NEWARK
PATERSON
PHILADELPHIA
PITTSBURGH
PROVIDENCE

RICHMOND
ST. LOUIS
TORONTO
WASHINGTON

When Writing, Please Say—“Saw Your Ad. in the CCJ”

4753

